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NATIONAL DAM SAFETY PROGRAM. GREAT NOTCH RESERVOIR (NJ 00244), --ETC(U)
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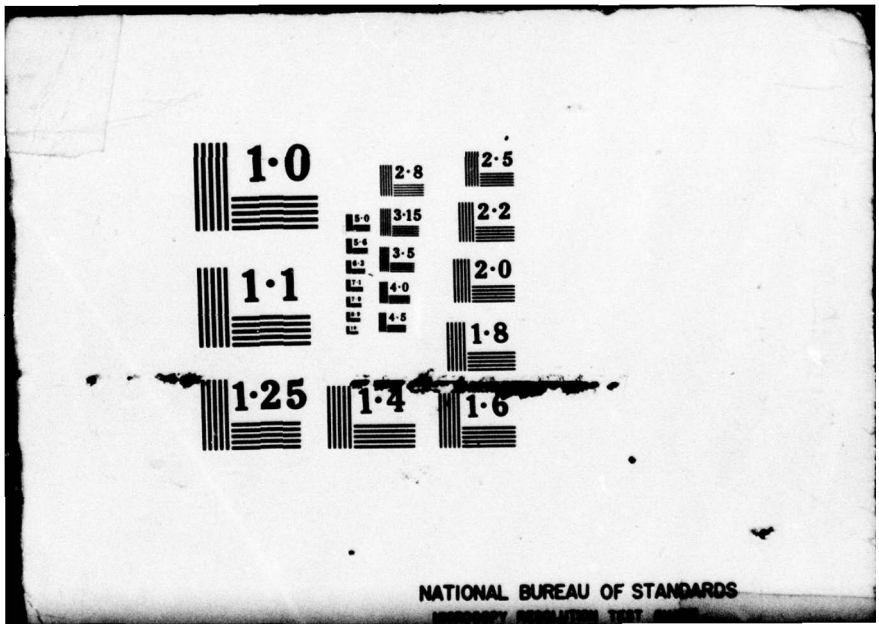
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NATIONAL BUREAU OF STANDARDS

PASSAIC RIVER BASIN
YANTECAW BROOK
PASSAIC COUNTY
NEW JERSEY

LEVEL II

GREAT NOTCH RESERVOIR
NJ 00244

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM.

Great Notch Reservoir (NJ 00244). Passaic River Basin, Yantecaw Brook, Passaic County, New Jersey. Phase 1 Inspection Report.

Approved for public release; distribution unlimited

(9) Final report.,
(10) Robert J. /Jenny
(15) DACW61-78-C-0124

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

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7. AUTHOR(s) Robert J. Jenny P.E.		8. CONTRACT OR GRANT NUMBER(s) DACW61-78-C-0124
9. PERFORMING ORGANIZATION NAME AND ADDRESS Jenny-Leedshill Engineering 318 South Orange Ave. South Orange, N.J. 07079		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	Visual Inspection
Spillway	National Dam Inspection Act report
Embankments	Structural Analysis
Safety	Great Notch Reservoir, N.J.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-D

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

15 MAY 1979

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Great Notch Reservoir in Passaic County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Great Notch Reservoir Dam, a high hazard potential structure, is judged to be in good overall condition. However, the spillway is considered seriously inadequate since 36 percent of the Probable Maximum Flood (PMF) would overtop the dam. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to determine the dam's embankment and foundation condition and structural stability. This should include test borings to determine material properties relative to stability and seepage and installation of piezometers to facilitate seepage studies. Any remedial measures found necessary should be initiated within calendar year 1980. Make a topographic survey of the dam site and monument the results for use in future inspections.

c. The following remedial actions should be completed within three months from the date of approval of this report:

(1) Remove the spillway flashboards.

(2) Relocate the chain link fence at the spillway.

d. The following remedial actions and procedures should be completed within six months from the date of approval of this report:

(1) Determine the source of seepage in the spillway channel and take remedial measures as needed.

(2) Investigate alternative methods of draining the reservoir.

(3) Operate all valves on a regular basis.

(4) Replace dislodged rocks on the embankment facing.

(5) Regularly inspect the dam and record all maintenance work.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Joseph Minish of the Eleventh District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N. J. Dept. of Environmental Protection
P. O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
N. J. Dept. of Environmental Protection
P. O. Box CN029
Trenton, NJ 08625

GREAT NOTCH RESERVOIR DAM (NJ00302)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 2 and 20 December 1978 by Jenny-Leedshill Engineers under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Great Notch Reservoir Dam, a high hazard potential structure, is judged to be in good overall condition. However, the spillway is considered seriously inadequate since 36 percent of the Probable Maximum Flood (PMF) would overtop the dam. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineerin studies and analyses should be performed to determine the dam's embankment and foundation condition and structural stability. This should include test borings to determine material properties relative to stability and seepage and installation of piezometers to facilitate seepage studies. Any remedial measures found necessary should be initiated within calendar year 1980. Make a topographic survey of the dam site and monument the results for use in future inspections.

c. The following remedial actions should be completed within three months from the date of approval of this report:

(1) Remove the spillway flashboards.

(2) Relocate the chain link fence at the spillway.

d. The following remedial actions and procedures should be completed within six months from the date of approval of this report:

(1) Determine the source of seepage in the spillway channel and take remedial measures as needed.

(2) Investigate alternative methods of draining the reservoir.

(3) Operate all valves on a regular basis.

(4) Replace dislodged rocks on the embankment facing.

(5) Regularly inspect the dam and record all maintenance work.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 11 May 1979

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-D

11 APR 1979

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

This is in reference to our ongoing National Program for Inspection of Non-Federal Dams within the State of New Jersey. Great Notch Reservoir Dam (Federal I.D. No. 00244), a high hazard potential structure, has recently been inspected. The dam is owned by the Passaic Valley Water Commission and is located on Yanticau Brook in West Paterson, Passaic County.

Using Corps of Engineers screening criteria, it has been determined that the dam's spillway is seriously inadequate since approximately 41 percent of the Probable Maximum Flood would overtop the dam. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise, or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard potential to loss of life downstream from the dam. As a result of this UNSAFE determination, it is recommended that the dam's owner take the following measures within 30 days of the date of this letter:

a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.

b. Develop and initiate a detailed emergency operation plan and downstream warning system. Also, around-the-clock surveillance should be provided during periods of unusually heavy precipitation.

NAPEN-D
Honorable Brendan T. Byrne

A final report on this Phase I Inspection with a detailed analysis of the situation, will be forwarded to you within two months.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

Cy Furn:
Dirk C. Hofman, Actg. Deputy Director
Division of Water Resources
N.J. Dept of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
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P.O. Box CN029
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UNSAFE DAM
NATIONAL PROGRAM OF INSPECTION OF DAMS

a. NAME: Great Notch Reservoir b. ID NO.: NJ00244

c. LOCATION State: New Jersey County: Passaic
River or Stream: Yanticaw Brook
Nearest D/D City or Town: Clifton

d. HEIGHT: 74 feet

e. MAXIMUM IMPOUNDMENT CAPACITY: 640 ac. ft.

f. TYPE: Earthfill with concrete core

g. OWNER: Passaic Valley Water Commission

h. DATE GOVERNOR NOTIFIED OF UNSAFE CONDITIONS: 11 Apr 79

i. CONDITION OF DAM RESULTING IN UNSAFE ASSESSMENT
Preliminary report calculations indicate 41% of PMF would overtop the dam.

l. URGENCY CATEGORY: UNSAFE, Non-Emergency

m. EMERGENCY ACTIONS TAKEN:
Gov. notified of this condition
by District Engineer's letter of 11 Apr 79

j. DESCRIPTION OF DANGER INVOLVED:
Overtopping and failure of the dam significantly increases hazard potential to loss of life and property downstream of dam.

n. REMEDIAL ACTIONS TAKEN:
N.J.D.E.P. will notify
dam's owner upon receipt of our letter

k. RECOMMENDATIONS GIVEN TO GOVERNOR:
Within 30 days of date of District Engineer letter the owner do the following:
a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.

b. In the interim, a detailed emergency operation plan and downstream warning system should be developed. Also, round-the-clock surveillance should be provided during periods of unusually heavy precipitation.

o. REMARKS: Final report, to be
issued within six weeks,
will have WHITE cover.

for W. H. ZINK, Coordinator
Dam Inspection Program
U.S.A.E.D., Philadelphia

R J Braun 4/20/79

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Great Notch Reservoir, Fed. I.D. No.NJ00244
State Located:	New Jersey
County Located:	Passaic
Stream:	Yantecaw Brook (Primarily off-stream pumped storage)
Dates of Inspection:	December 2 and 20, 1978

Brief Assessment of General Condition of Dam

The visual inspection of the dam indicated the embankment to be in good overall condition and without any critical signs of distress.

The hydrologic and hydraulic analyses indicate that the spillway, with flashboards in place as they presently are, is seriously inadequate because it can pass only about 35 percent of the Probable Maximum Flood (PMF). If the flashboards were removed, the spillway could pass about 65 percent of the PMF and the spillway would thus be classified as inadequate, not seriously inadequate.

Minor seepage was noted below the spillway, and there are certain maintenance tasks that have been neglected. Most valves controlling the discharge through the outlet works have not been operated in many years and are thus in questionable operating condition. There is no emergency outlet and the reservoir can be drained only by releases into the owner's distribution system.

It is recommended that the spillway flashboards and downstream security fence be removed very soon. Other recommendations are of a less urgent nature and should be implemented in the near future. These include determination of the source of seepage in the spillway channel and taking remedial measures as needed, investigation of alternative methods of draining the reservoir, regular operation of all valves, removal of vegetation on the embankment, replacement of rock facing on the embankment, regular inspection of the dam, installation of survey monuments and piezometers on the downstream embankment to monitor phreatic surface.

More detailed and sophisticated hydraulic and hydrologic studies to more accurately determine the spillway capacity should be undertaken by the owner within 6 months. Remedial action, as a result of these studies, should be initiated within one year. In the interim, a warning and evacuation plan should be implemented to provide adequate warning to downstream residents. Also, surveillance of the dam should be provided during periods of heavy precipitation.

Frank L. Panuzio

Frank L. Panuzio, P.E.
Project Manager

Robert J. Jenny, P.E.
Project Director
New Jersey License No. 9878

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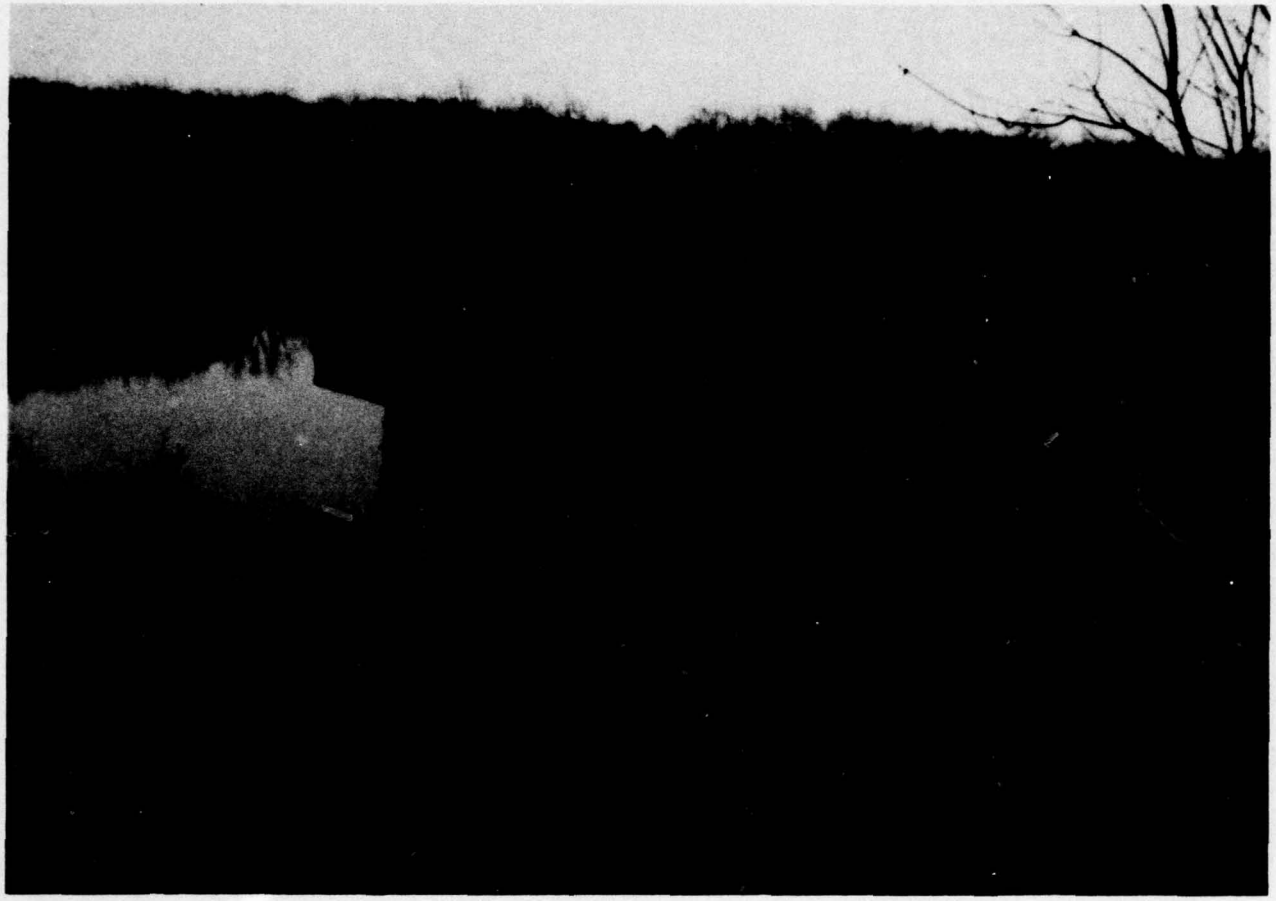


GREAT NOTCH DAM
View eastward from right abutment.
(December 2, 1978)

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrclogic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

GREAT NOTCH RESERVOIR DAM
Federal I.D. No. NJ 00244
New Jersey I.D. No. 153

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The National Dam Inspection Act, Public Law 92-367, 1972, provides for the National Inventory and Inspection Program by the U. S. Army Corps of Engineers. This report has been prepared in accordance with this authority, through contract between the State of New Jersey and Jenny-Leedshill Engineers. The State of New Jersey has also entered into an agreement with the U. S. Army Engineer District,Philadelphia, to have this work performed.

b. Purpose of Inspection

The purpose of this inspection was to evaluate the general structural integrity and hydraulic adequacy of the dam, and to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Description of Dam and Appurtenances

Great Notch Dam is an earthfill dam with a concrete core. The dam impounds a 537 acre feet pumped storage reservoir with little natural drainage. The dam is approximately 460 feet long, 74 feet high, and has a crest width of 16 feet. Embankment slopes are 2H:1V on both the upstream and downstream sides, with a 16-foot wide and 12-foot wide berm, respectively, on the upstream and downstream sides. Rock riprap covers the upstream face, and the downstream slope is covered with rock facing. A 50-foot wide spillway is located on the left abutment.

b. Location

The dam is located across Yantecaw Brook, a branch of Third River in the Passaic River valley, in northeastern New Jersey in Passaic County, near West Paterson, one mile west of Clifton. The location of the dam is shown on Plate 1.

c. Size Classification

The size classification of the dam based on its 74-foot height and the maximum reservoir capacity of 640 acre feet is intermediate. The criteria for size classification of dams are set forth in the Corps' Guidelines. An intermediate size dam is one in which the reservoir capacity is equal to or greater than 1000 acre feet and less than 50,000 acre feet, and/or the maximum height is equal to or greater than 40 feet and less than 100 feet.

d. Hazard Classification

Great Notch Dam is classified as a high hazard dam because of the serious damage and loss of more than a few lives that could occur in the event of dam failure at a major highway 2000 feet downstream and in certain western areas of the city of Clifton (population 80,000) and other communities further downstream in the Third River flood plain.

e. Ownership

The dam is owned by the Passaic Valley Water Commission, 1525 Main Avenue, Clifton, New Jersey 07442.

f. Purpose of Dam

The dam and reservoir provide storage of treated water pumped into the reservoir. The water is used as

a potable supply for certain topographically high areas in the city of Clifton and the reservoir serves a secondary function as a balancing reservoir for the owner's distribution system.

g. Design and Construction History

Great Notch Dam, sometimes called Garrett Mountain Reservoir Dam, was constructed in 1898-1899 for the East Jersey Water Company. In 1929 the owner at that time, Passaic Consolidated Water Company, proposed to raise the dam 10 feet to increase the reservoir capacity. The application to raise the dam was denied, even though some preliminary construction work had been started, apparently because of a condemnation action which was pending against the owner. Shortly thereafter the dam and appurtenant works became the property of the Passaic Valley Water Commission, the present owner. Available plans indicate that reinforcement was added to the inlet and outlet conduits in 1951 and that the spillway crest was raised sometime prior to 1962 at which time flashboards were added to the crest.

h. Normal Operational Procedures

The owner endeavors to keep the reservoir level as close as possible to the spillway crest elevation of 427 feet. The level must be above elevation 422 feet to provide sufficient head to serve topographically high areas. Water is pumped into the reservoir whenever it is available, normally at nighttime or on weekends. The reservoir is not lowered prior to a storm. The spillway flashboards are apparently kept in place at all times.

1.3 Pertinent Data

a. Drainage Area - 0.3 square miles (Yantecaw Brook)

b. Discharge at Damsite

- Spillway capacity without flashboards at maximum pool elevation - 675 cfs.
- Spillway capacity with flashboards at maximum pool elevation - 335 cfs.

c. Elevation (ft. above MSL)

• Top Dam	430
• Spillway crest	
- without flashboards	427.0
- with flashboards	428.25
• Streambed at centerline of dam	356 (Approx.)

d. Reservoir

• Length of maximum pool	3300 ft.(el. 428.25)

e. Storage (acre-feet)

• Design surcharge	
- without flashboards	537
- with flashboards	580
• Top of dam	640

f. Reservoir Surface (acres)

• Top dam	38
• Spillway crest	33

g. Dam

• Type	Earthfill with concrete core wall
• Length	460 ft.
• Height	74 ft.

• Top Width	16 ft.
• Side Slopes	1V:2H
• Zoning	Not known
• Impervious Core	Concrete core wall

h. Diversion and Regulating Tunnel

• Type	Twin 9-ft. diameter tunnels in downstream embankment housing 48-in. inlet and outlet pipes
• Length	150 ft.
• Access	Doors at downstream toe of dam. Also manholes.

i. Spillway

• Type	1 ft. wide weir on top of old broad crested weir
• Length of weir	49.9 ft.
• Crest elevation	
- without flashboards	427.0 ft.
- with flashboards	428.25 ft.
• Flashboard height	1.25 ft.
• U/S Channel	Rock masonry training walls
• D/S Channel	Natural soil channel

j. Regulating Outlets

- 1-48 in. diameter steel distribution main
- 1-48 in. diameter steel force main
- Multi-level gated inlets in gate house

SECTION 2: ENGINEERING DATA

2.1 Design

a. Geologic Conditions

Great Notch Dam is situated on top of the First Watchung Mountain in the Piedmont Lowlands physiographic province. This province and its regional geology are described in Appendix C to this report.

The dam and its reservoir are located in a small, narrow, bedrock bordered valley which is oriented approximately north-south, parallel to the strike of the "Newark" basalt bedrock. While this orientation is somewhat anomalous to the general structure, it is parallel to the direction of movement of the Wisconsin age glacier and large glacial striations (grooves cut in the bedrock by movement of the glacier) were observed on both abutments.

The right abutment of the dam is constructed against a near vertical rock face while on the left abutment the rock slope is more gentle with a very thin (typically less than 5 feet) mantle of glacial till.

Bedrock can be seen at the toe of the dam near the abutments but cannot be seen in the relatively narrow flat valley floor in the central portion of the dam. It would appear, however, that the dam was probably built on top of rock for its full width.

While the soil depth on the top of both abutments is shallow, thick deposits of alluvium were observed in old borrow pits downstream of the dam. In one pit, well stratified layers of gravel, sand and cobbles could be seen in a steep cut approximately 30 feet high.

These deposits may represent drumlins or glacial outwash deposited on the southern "shadow" side of the bedrock exposure in front of the advancing glacier.

The project is located in an area classified as Seismic Zone 1 and should only be subject to shaking from distant earthquakes.

b. Design History

Engineering data pertaining to the design of the dam are limited to various plans and drawings, most of which are included herein as Plates 2 through 9 . The dam was designed to span a small stream, Yantecaw Brook, with the spillway in the left abutment (Plate 2). A section of the dam (Plate 3) indicates both upstream and downstream slopes to be 2H:1V, with a 2.5 feet thick rock facing. Nothing is known about embankment materials but it appears reasonable to assume that some or all of the borrow materials were taken from the excavated reservoir (Plate 4).

The concrete core wall extends the length of the embankment to about 30 feet beyond the spillway on the left abutment. In section, it is 9 feet wide at the base and 5 feet wide at top (Plate 3). The top of the core wall is at elevation 427 or 3 feet below the top of the embankment.

The gate house was designed as a rubble masonry structure rising 61 feet from the base of the dam to the top, with the house itself resting on top of the rubble masonry structure (Plates 3, 5 and 6). Water from the reservoir enters the base of the structure through an arched passageway on the upstream side. A trashrack consisting of 4-inch by ½-inch bars, 4 inches on center, covers the opening (Plate 7). After entering

the base of the structure, water rises by hydrostatic head in the upstream of 2 chambers from which it can be released into a downstream chamber through 6 gated openings at 3 different elevations. From there water flows into a 48-inch distribution main. Water is pumped into the reservoir through a parallel 48-inch force main, entering a 36-inch line at the gate house and discharging near the center of the reservoir.

The original spillway (Plate 2) was raised sometime prior to 1962 by the addition of a 2-foot high, 1-foot wide concrete sill (Plate 8). In 1962 15-inch high flashboards were added. No hydraulic or hydrologic computations for the spillway design are available.

2.2 Construction

Almost nothing is known of the original construction practices, and as-built properties of the materials are not known. A drawing dated after construction indicates that the foundation for the core wall was extended about 3 to 5 feet into the bedrock (Plate 9). This same drawing indicates the gate house structure may be resting on fill material.

2.3 Operation

Daily records of reservoir levels are maintained by the owner. There are no monitoring devices on the dam. It was reported that there are survey markers on the dam but these were not observed and there are no records of surveys having been made.

2.4 Evaluation

a. Availability

Data available on the original design and construction of the dam are limited to construction drawings,

most of which are included herein. A small amount of information is available on as-built conditions from correspondence in the State files regarding the proposed raising of the dam in 1929. Few data are available on subsequent repair or maintenance work, and there has been no recent survey of the dam. Most of the available data are listed in Appendix A.

b. Adequacy

Available data are insufficient to adequately evaluate the design. Calculations relating to the structural design of the dam or the stability of the as-built structure are not available. Nothing is known of embankment construction methods, testing methods, or as-built material properties. Little is known of foundation conditions.

c. Validity

Plans are old but appear to approximately reflect present conditions regarding details of embankment configuration and locations of appurtenant structures. Because the dam has not been surveyed in recent years, the top elevation of the dam may be somewhat different than indicated on the plans.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The visual inspections of Great Notch Dam were made on December 2, 1978 and on December 20, 1978. The water surface elevation at the time of the first inspection was approximately 425 feet or 2 feet below the spillway crest. Discharge from the reservoir through the distribution system was approximately 4 cfs.

The visual inspection did not reveal any critical signs of distress in the dam. Few remedial measures have been implemented over the years and general maintenance appears to have been rather sporadic.

Detailed inspection was made of the dam, appurtenant structures, reservoir area, and the downstream channel. Descriptions of the findings of these inspections are summarized in the paragraphs which follow. The checklist of visual inspection items is included in Appendix A. Geologic and foundation conditions observed at the time of inspection are noted in greater detail in Section 2.1-a.

b. Dam

The dam was inspected for signs of settlement, seepage, erosion, cracking and any other evidence of undesirable behavior which might affect the stability of the structure. There were no discernable vertical or horizontal misalignments of the crest (see Overview Photo). The exposed riprap above the waterline appears to be in good condition (Photo 1).

Rock facing covers the entire downstream slope of the dam. The rock above the bench in the embankment appears to be carefully hand-placed (Photo 2), while that below the bench is randomly dumped (Photo 3). A small rock slide, about 20 by 50 feet, was observed on the lower right side of the embankment (Photo 4). Small trees have grown in this area. The growth of trees is a general problem on the downstream embankment, but it is particularly acute along the embankment bench (Photo 5). Overall, the downstream side of the dam appears to have a reasonably even slope, with only minor swales and little erosion.

The abutments on each side of the dam were examined for any indications of apparent instability or seepage. On the left abutment, near the top of the dam, there is a small drainage channel cut into the hillside. About 5 gpm of seepage was observed in this channel but at an elevation higher than the reservoir level. Downstream abutments on both sides of the dam are exposed quartzite bedrock. The embankment-abutment contacts appear to be sound. A rock ledge on the lower left abutment separates the natural spillway channel from the dam embankment (Photo 6).

c. Appurtenant Structures

Spillway

The spillway crest has wooden flashboards installed on top of it (Photo 7). The concrete sill and stone masonry training walls appeared to be in satisfactory condition. Immediately downstream there is a chain-link fence installed for security purposes (Photos 7 and 8). This fence could catch floating debris and seriously impede flow through the spillway in the event of flood.

A small amount of seepage was noted in the channel downstream of the spillway. The source of this seepage could not be determined but the condition merits further attention. The downstream natural channel is heavily overgrown with trees.

Outlet Works

The observable structures of the outlet works include the gate house at the top of the dam and the twin tunnels at the downstream toe of the dam housing the force main and the distribution main. The gate house itself is in reasonably good condition, although vandals have broken the windows of the building. Inside the building, most of the gate controls appear not to have been operated for some time (Photo 9). The owner's representatives reported that 2 of the controls were operated in recent years but the remaining have not been operated in more than 20 years. The valve controlling the 48-inch outlet pipe has not been closed for many years, since it is feared that it cannot be reopened.

The tunnels housing the 48-inch force main and distribution main were inspected for a short distance inside the entrances (Photo 10). A small amount of seepage was noted in the bulkhead of the outlet tunnel and the floors of both tunnels were covered with wet slime.

d. Reservoir Area

The reservoir contains treated water and is therefore very clean and free of turbidity. The right bank consists of a high rock outcrop which appears stable (Photo 11). The left bank and upstream areas are heavily wooded with moderate slopes and have some debris

producing potential (Photo 12).

e. Downstream Channel

The downstream channel is poorly defined. It is very heavily wooded and slopes moderately toward a major highway (U.S. Highway 46) 2000 feet downstream. No houses were observed in the immediate area but there are major population centers further downstream.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

Great Notch Dam impounds treated water pumped into the reservoir, plus the minor runoff originating from the small reservoir drainage area. The source of the pumped water is Wanaque Reservoir and the Passaic River. The water is pumped from the owner's purification plant at Little Falls through a 51-inch pipeline to the Great Notch Booster Pump Station where it is pumped into a 48-inch line going to the reservoir (Plate 9). The capacity of the 2 booster pumps is 10 mgd total. The pumps are usually operated at night or on weekends when more water is available for storage. When the pumps are not in operation water can be released from the reservoir through the 48-inch force main. An average of 0.5 mgd is released in this manner.

The primary discharge from the reservoir is made through the 48-inch distribution line. Intake is through multi-level gates in the gate house. The maximum rate at which water can be released into the owner's distribution system is reported to be 40 mgd. The average rate is about 2 mgd through the distribution line plus the previously mentioned 0.5 mgd through the force main. In case of emergency there is no way to waste water from the distribution line, other than by opening fire hydrants.

The reservoir normally is kept near the spillway crest elevation of 427 feet and is not allowed to fall below elevation of 422 feet, so as to maintain sufficient head to serve topographically high areas of the

service area. The owner reports that there is occasional flow over the spillway when there is a storm and coincident pumping into the reservoir.

Water is occasionally drawn from the reservoir through a 36-inch siphon to New Street Reservoir, a 50 mg artificial reservoir north of Great Notch Reservoir (Plate 1). This is done to draw off poor quality, stagnant water from Great Notch Reservoir.

4.2 Maintenance of Dam

There has apparently been little maintenance work done on the dam in recent years. Maintenance work is done by the owner. No records of maintenance work were found.

4.3 Maintenance of Operating Facilities

Neither the multi-level intake gates nor the valve controlling the 48-inch distribution line are operated and, in fact, most have not been operated in many years. Two of the gates were successfully operated about 2 years ago when there was a water quality problem in the reservoir.

The 48-inch force main and the 48-inch distribution main in the tunnels were reinforced with steel reinforcement and a concrete jacket in 1957.

4.4 Description of Warning Systems

There is no formal warning system. The dam is checked by the owner's personnel twice daily and there is a caretaker on the property to secure it from vandals. The reservoir is fenced in for security purposes.

4.5 Evaluation of Operational Adequacy

There is presently no way to lower or drain the reservoir other than through the owner's water distri-

bution system. This condition imposes a limitation on emergency operational flexibility.

Maintenance of the dam and operating facilities is somewhat lax. The fact that most of the outlet works controls have not been operated for many years lends doubt as to whether they would work, should an emergency arise.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

As already stated, Great Notch Dam is classified as high hazard and intermediate in size. In accordance with the Corps of Engineers', "Recommended Guidelines for Safety Inspection of Dams," the Spillway Design Flood (SDF) is the Probable Maximum Flood (PMF).

Data obtained from State files indicate the drainage basin area of the Dam is 0.3 square miles. Elevations within the basin range from about 500 feet mean sea level along the perimeter of the drainage basin to about 425 feet in the valley floor. Land use patterns within the watershed consist mostly of forests along the slopes of the valley. The reservoir constitutes about 17 percent of the total watershed area. The drainage basin is delineated on a U. S. Geological Survey topographic map and is presented on Plate D-1, Appendix D.

The hydraulic and hydrologic features of the dam were evaluated using criteria set forth in the Corps of Engineers', "Recommended Guidelines for Safety Inspection of Dams," and additional guidance and criteria provided by the Philadelphia District Corps of Engineers. The Probable Maximum Precipitation (PMP) was calculated using Hydrometeorological Report No. 33 and the Hop Brook reduction factor of 0.80 for misalignment of the storm.

The Probable Maximum Flood (PMF) was calculated using the Corps' computer program HEC-1, Dam Break Version. In computing the PMF the Corps requested that

the SCS triangular unit hydrograph with curvilinear transformation be used. The computer program was used to calculate this unit hydrograph from the basin lag. A lag time of 0.2 hours was calculated for the basin and used in the program.

An initial infiltration loss of 0.5 inch and a constant infiltration loss rate of 0.05 inch per hour were used in the HEC-1 program to give the rainfall excess. These values were selected because the reservoir represents a large percentage of the basin area and slopes into the reservoir are relatively constant and steep. Using the excess rainfall and the unit hydrograph, the program computed the peak inflows of the 25 percent, 50 percent, 75 percent, and 100 percent PMF. These inflows are approximately 670 cfs, 1330 cfs, 1990 cfs, and 2660 cfs, respectively.

At the time of the field inspection, Great Notch Dam spillway had flashboards in place. The presence of these flashboards could have a significant impact on the ability of the spillway to pass the SDF. Thus, two hydraulics/hydrology analyses of the dam were made, one, assuming no flashboards on the spillway and, the other, assuming the flashboards are in place. The analysis that assumes no flashboards is presented first.

Hydraulic & Hydrologic Analysis - No Flashboards

The various percentages of the PMF inflow hydrograph were routed through the reservoir using the Modified Puls Method by the HEC-1 program. The peak outflow of the 25 percent, 50 percent, 75 percent and 100 percent PMF were calculated to be approximately 200 cfs, 450 cfs, 770 cfs, and 1500 cfs, respectively. The flood routings indicated that all floods greater

than about 65 percent of the PMF will overtop the dam. A plot of percent PMF versus peak outflow discharge is presented as Plate D-2 in Appendix D.

The spillway and overtop stage-discharge rating curve used in the flood routings was calculated using the weir equation and assuming free overflow across the entire length of the dam and spillway. The spillway is a modified broad-crested weir with a cyclone fence just downstream. A discharge coefficient of 2.6 was used for this weir because the first flood flows would pass through the spillway and these flows would carry the majority of reservoir debris which would collect on the cyclone fence. The dam crest is a broad-crested weir with a discharge coefficient of 3.1. The reservoir stage-storage curve was determined from U. S. Geological Survey 7.5 - minute topographic maps and data obtained from the owners. This stage-storage curve was extended above the top of dam to include surcharge storage during peak flood discharges. In the reservoir routing computations, possible discharges through the outlet works were excluded because their capacity is small compared to the PMF. The stage-storage and the spillway and overtop stage-discharge curves are presented in Appendix D as Plates D-3 and D-4, respectively.

Hydraulic & Hydrologic Analysis - With Flashboards

The spillway can accommodate 15 inches of flashboards and the flashboards were in place at the time of inspection. Consequently, this second analysis of the dam was made assuming 15 inches of flashboards are in place during the PMF. The assumptions used in this analysis were the same as those in the analysis without flashboards, except the weir coefficient of the

spillway was increased to 2.9 to better approximate the flow characteristics of the flashboards.

The analysis without flashboards indicated that the spillway with flashboards probably cannot pass one-half the PMF. Consequently, the various percentages of the PMF, assuming the dam would not breach and assuming the dam would breach, were routed 0.4 miles downstream through three successive reaches to Highway 46. A high hazard would exist at Highway 46 due to flooding. For the routing calculations, estimates of channel shapes, slopes and roughnesses were made based on conditions observed in the field and U.S.G.S. topographic maps. The locations of the cross-sections used in these routings are shown on page D-5, Appendix D.

The breach parameters used in the HEC-1 analysis are: the breach is triangular in shape, has 60-degree side slopes, will extend to the approximate original reservoir floor elevation (370'), will begin breaching when the dam is first overtopped, and will develop to its maximum size in 1.0 hours.

The peak outflow for the 25 percent, 50 percent, 75 percent and 100 percent PMF, assuming the dam does not breach, were calculated to be 200 cfs, 620 cfs, 1330 cfs, and 1940 cfs, respectively. These routings indicate that with flashboards the spillway can pass only 35 percent of the PMF without overtopping. The peak overflow for the 25 percent, 50 percent, 75 percent and 100 percent PMF, assuming the dam does breach, were calculated to be approximately 200 cfs, 13700 cfs, 14300 cfs, and 14000 cfs, respectively.

Three floods were compared in assessing the downstream hazard: (1) the PMF assuming the dam is breached; (2) the PMF assuming the dam is not breached; and (3) the

flood that is approximately equal to the existing capacity of the spillway with flashboards (25% PMF). The flood depth, width and mean flow velocity of these three floods at Highway 46 are summarized in the following tabulation. The hazard potential of flooding is discussed in Section 1.2d.

Flooding Characteristics at Highway 46

	25% PMF Without Breaching	PMF Without Breaching	PMF With Breaching
Peak Discharge, cfs	200	1900	13800
Peak Flood Depth, ft.	1.8	4.5	9.4
Peak Flood Top Width, ft.	70	210	470
Peak Flow Velocity, fps	3.2	4.4	6.6

The dam owner has indicated that there is no way of draining the reservoir other than to stop pumping water into the reservoir and using reservoir storage to supply the distribution system. Water use out of the distribution system is reported to average about 7.7 acre-feet per day. Assuming this average rate for draining the reservoir, it is estimated that the reservoir can be drained, from a spillway level full condition, in approximately 2.5 months.

b. Experience Data

Records of lake levels are maintained for this site. The reservoir is operated to maintain water levels above elevation 422 feet in order to provide adequate pressures through the service area. There are no reports or evidence that the dam has ever been overtopped, although it is reported there is occasional flow over the spillway.

c. Visual Observations

There is no defined spillway channel downstream of

the embankment. No dwellings were observed immediately downstream. The flood plain below the dam contains a fairly dense stand of medium and small trees with significant undergrowth.

Just downstream of the spillway crest is a cyclone fence that would collect debris during floods. If the fence collects sufficient quantities of debris, it could significantly reduce the spillway capacity (Photo 8).

d. Overtopping Potential

As indicated in Section 5.1-a, without flashboards, Great Notch Dam spillway can pass about 65 percent of the PMP. During the PMF the dam would be overtopped about 0.6 feet. Without flashboards the spillway is classified, in accordance with the Corps' guidelines, as Inadequate.

With 15-inches of flashboards in place, all floods greater than about 35 percent of the PMF, when routed through the reservoir, will overtop the dam. The PMF will overtop the dam for about 4.0 hours and have a maximum stage about 1.0 foot above the top of dam. One-half the PMF will overtop the dam for about 1.3 hours and will have a maximum stage about 0.3 feet above the dam crest. These overtopping heights assume the dam remains in its current condition. A dam breach analysis was made to determine if the existing spillway is Seriously Inadequate because (1) the Spillway Design Flood is the PMF; (2) the spillway is not capable of passing one-half the PMF; and (3) there is a high downstream hazard to loss of life. The results of this analysis are presented in Section 5.1-a. One of the

Corps' criteria for classifying a spillway as Seriously Inadequate is, "Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure."

The data tabulated in Section 5.1-a were used to assess the degree of significance that overtopping failure would increase the downstream hazard. Assuming the dam does not breach during the PMF, the discharge at Highway 46 will be about 1900 cfs as compared to a breach peak discharge of about 13,800 cfs. The flow depth, top width and velocity will be much greater during the breach peak discharge and result in a significantly higher downstream hazard. For this comparison, the spillway is classified, in accordance with the Corps' guidelines, as Seriously Inadequate.

Currently the spillway is classified as Seriously Inadequate; however, if the flashboards were removed, the spillway would be reclassified to Inadequate.

embankment. There has been no recent survey of the dam. There are no records of maintenance or inspections.

d. Post-Construction Changes

The only major post-construction change was the raising of the spillway crest and the addition of flashboards in recent years. This change indirectly affects the structural stability of the dam by lowering the hydraulic capability of the spillway and thus increasing the probability of overtopping of the dam.

e. Seismic Stability

The dam is located in Seismic Zone 1 in which it may be generally assumed that there is no hazard from earthquake, provided static stability conditions are satisfactory and conventional safety margins exist. Although the dam appears to have adequate static stability, a stability analysis would be required to verify this.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety

The spillway of the dam, without flashboards in place, is inadequate and is capable of passing 65 percent of the Probable Maximum Flood (PMF). With flashboards in place, as they presently are, the spillway can pass only about 35 percent of the PMF and is seriously inadequate.

Structurally, the dam appears to be adequate. The slopes and crest are without any major discontinuities or evidence of distress. Although nothing is known of the embankment materials, it is known that the dam has a concrete core wall that extends into bedrock. However, the core wall should not be expected to provide structural stability if overtopping should result in removal of embankment materials.

Most of the valves have not been operated in many years and are thus in questionable operating condition.

b. Adequacy of Information

Data are insufficient to evaluate the stability of the dam, since nothing is known of the design, construction or as-built properties of the embankment materials. Little is known of the core wall, other than its configuration. The mode of operation of the gates of the intake structure is imprecisely known. The dam has not been surveyed in many years, thus information on elevations and slopes may be inexact.

c. Urgency

The spillway flashboards and downstream security fence should be removed very soon. Other measures as itemized below are of a less urgent nature and should be implemented in the near future.

d. Necessity for Additional Data/Evaluation

Seepage and stability analyses should be on record for all dams in the high hazard category. Great Notch Dam is so classified; however, based on the visual inspection and satisfactory performance of the dam, the structural stability and seepage characteristics appear to be satisfactory. Even so, it is considered that seepage and stability analyses are desirable, and should be done after a boring program, by soils engineers.

It is recommended that the dam be surveyed to verify the existing crest elevation and side slopes. This could become the basis for periodic monitoring surveys in the future.

More detailed and sophisticated hydraulic and hydrologic studies to more accurately determine the spillway capacity should be undertaken by the owner within 6 months. Remedial action, as a result of these studies, should be initiated within one year.

7.2 Remedial Measures

a. Remedial Action

It is recommended that the owner perform the following remedial measures:

1. Remove the flashboards from the spillway and relocate the chain-link fence at the spillway to a location where it will not create a debris buildup hazard.

2. Determine the source of seepage below the spillway and take remedial action as necessary.
3. Investigate alternative methods of draining the reservoir, including installation of an emergency drain.

b. Operation and Maintenance Procedures

The following operation and maintenance procedures are recommended:

1. Regularly operate all valves at the intake structure and outlet works.
2. Remove all trees and brush from the face and crest of the dam and from the spillway channel.
3. Replace dislodged rock facing on the downstream embankment.
4. Regularly inspect the dam and keep records of all maintenance work.
5. Install survey monuments on the crest and downstream embankment and periodically make settlement surveys.
6. A contingency plan and an emergency warning system should be established to provide adequate warning to downstream residents. Also, surveillance of the dam should be provided during periods of heavy precipitation.

PLATES

PLATE 1

VICINITY MAP

JENNY-LEEDSHILL JANUARY 1979

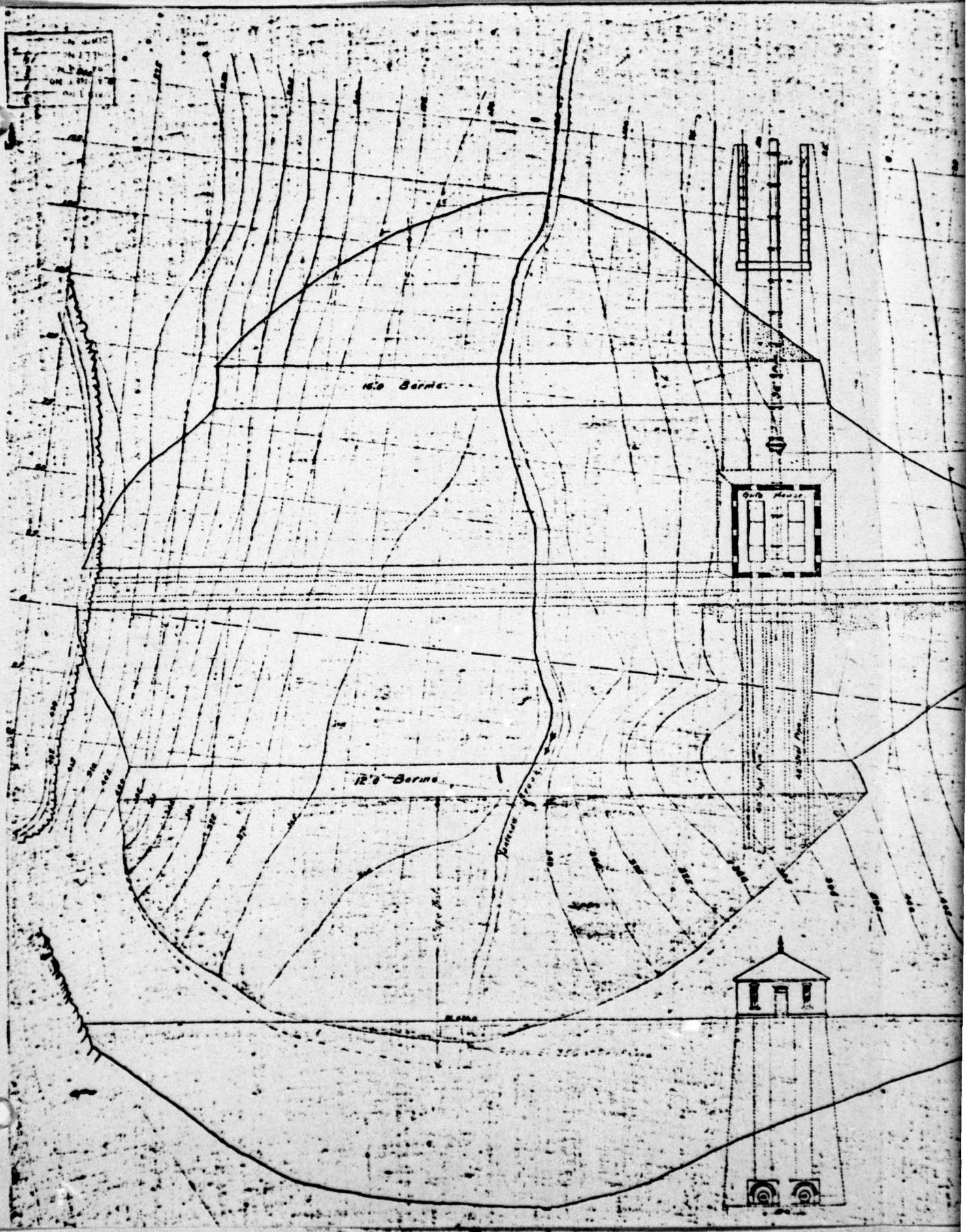
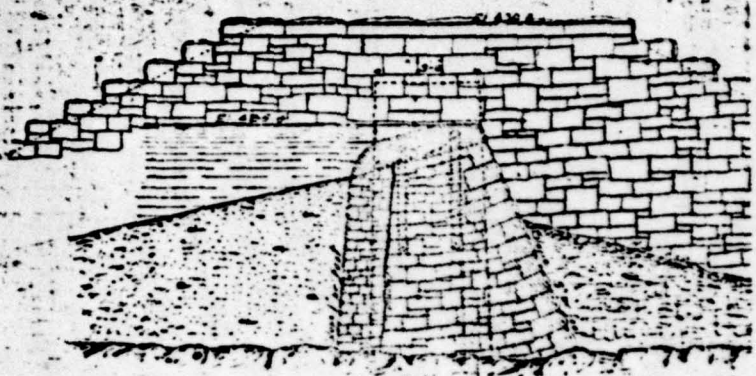

16'0 Berme
Gate House
12'0 Berme

PLATE 2

Sheet No. 1

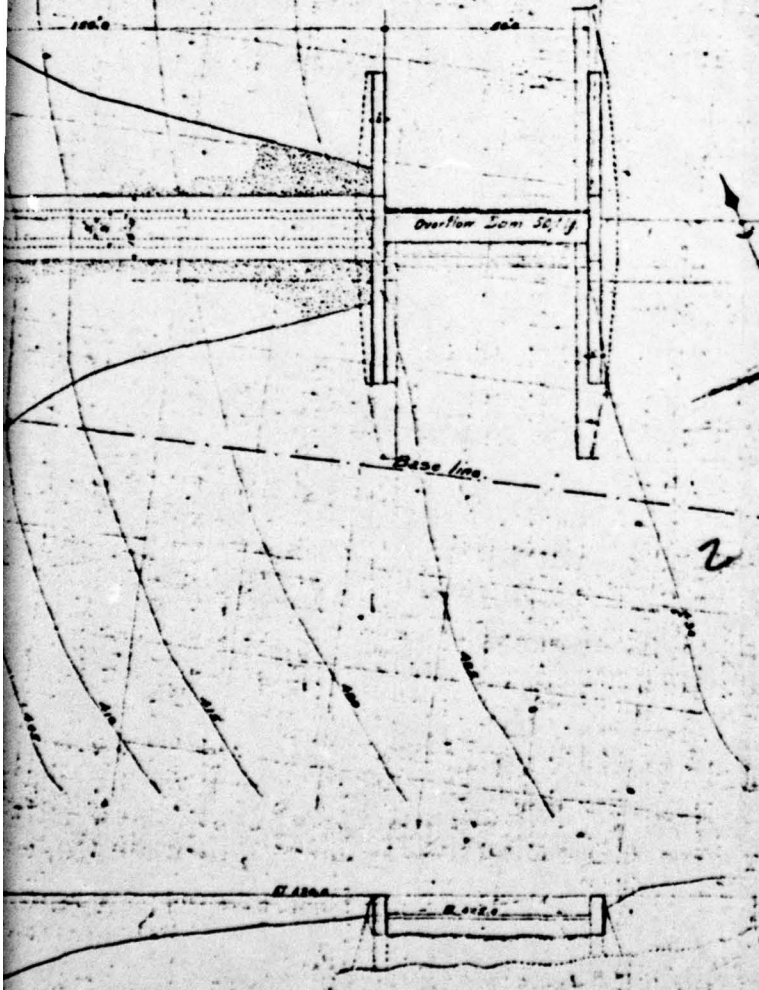
Section of Overflow Dam.

(West End)



Section of Overflow Dam.

(East End)



PASSAIC VALLEY WATER COMMISSION
CITY HALL ANNEX
[illegible] ELLISON STREET, PATERSON, N. J.

The East Jersey Water Company

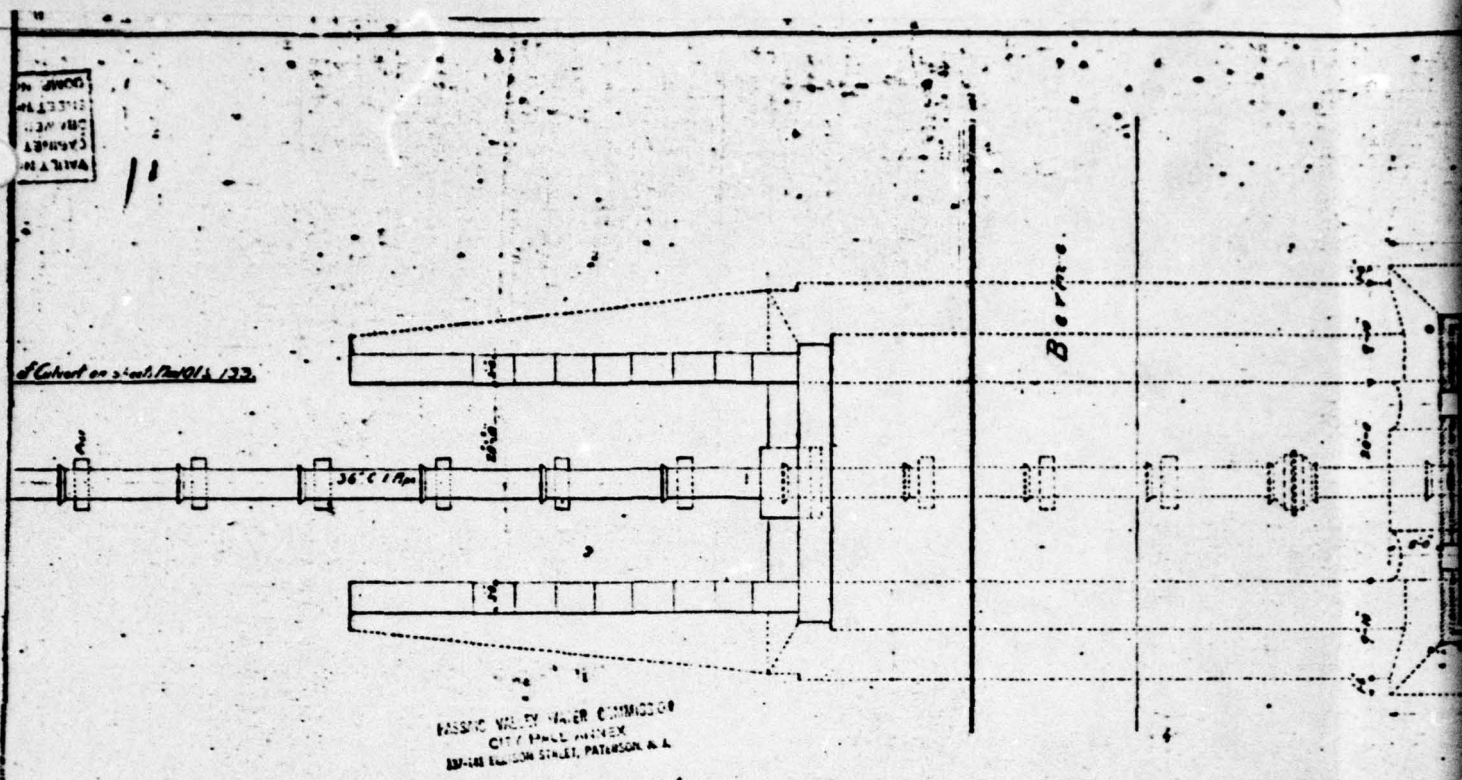
Contour Plan of Dam Site for

Great Notch Reservoir

April 1899.

VAULT
CABINET
DRAWER
SHEET
COPY

1
Ft 5



The East Jersey Water Company.

Plan & Section of Gate House & Main Dam for Great Notch Reservoir.

August 1899.

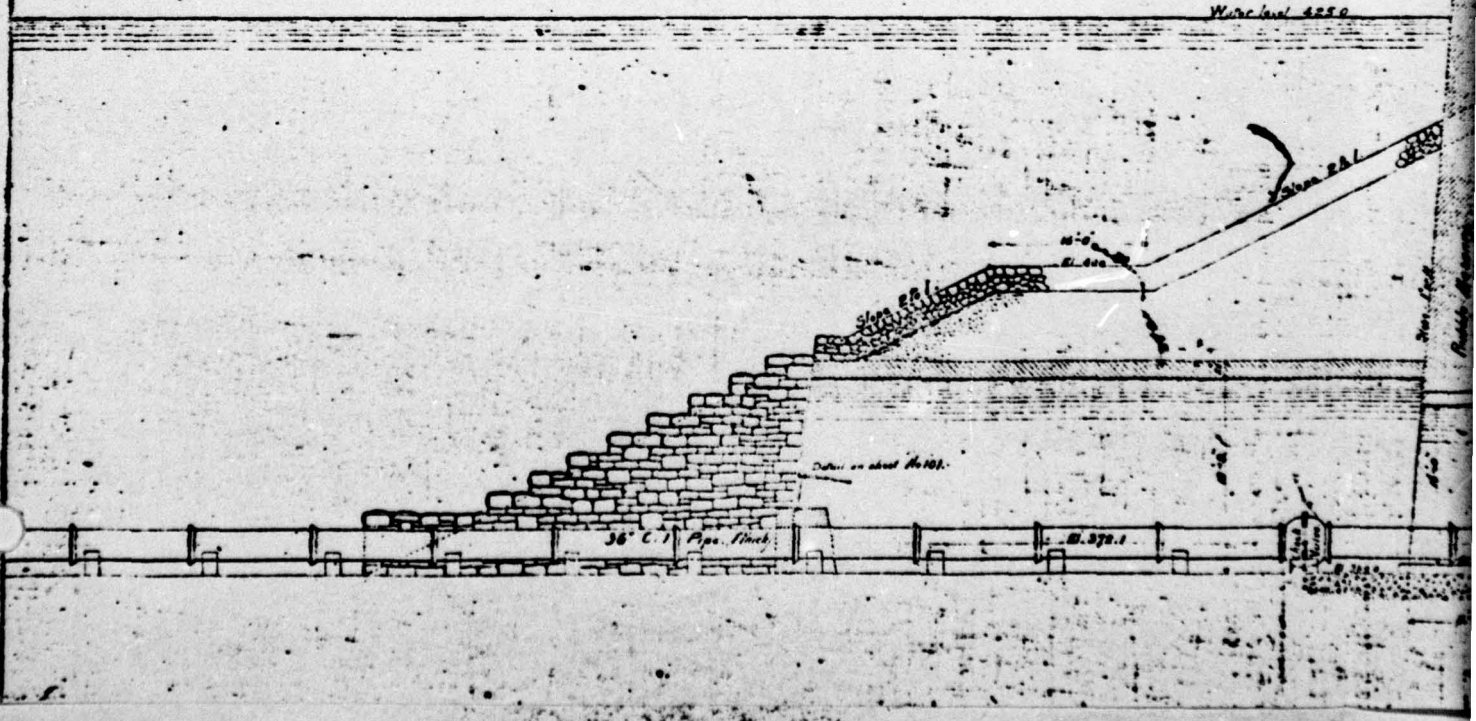
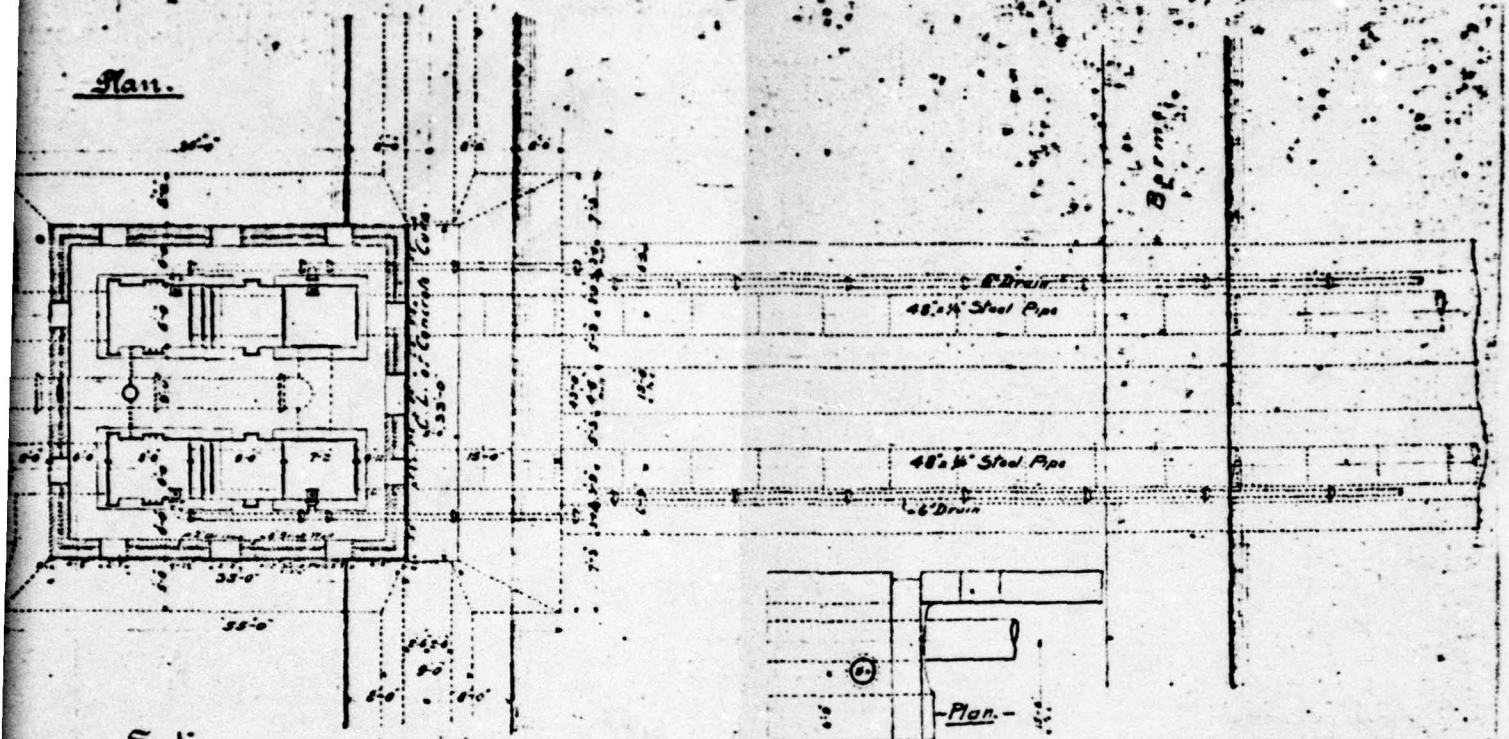
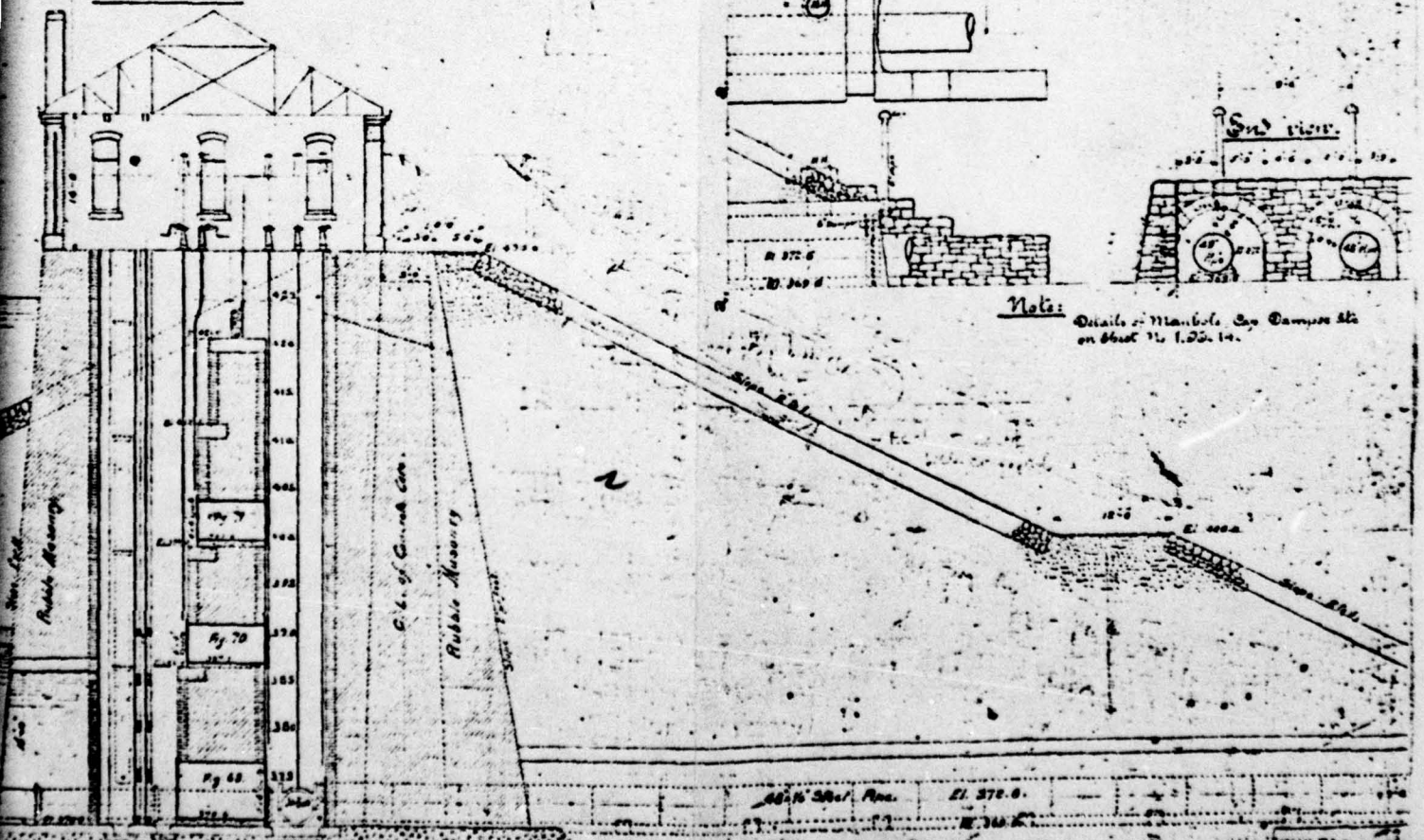


PLATE 3 Sheet No. 100.

Plan.



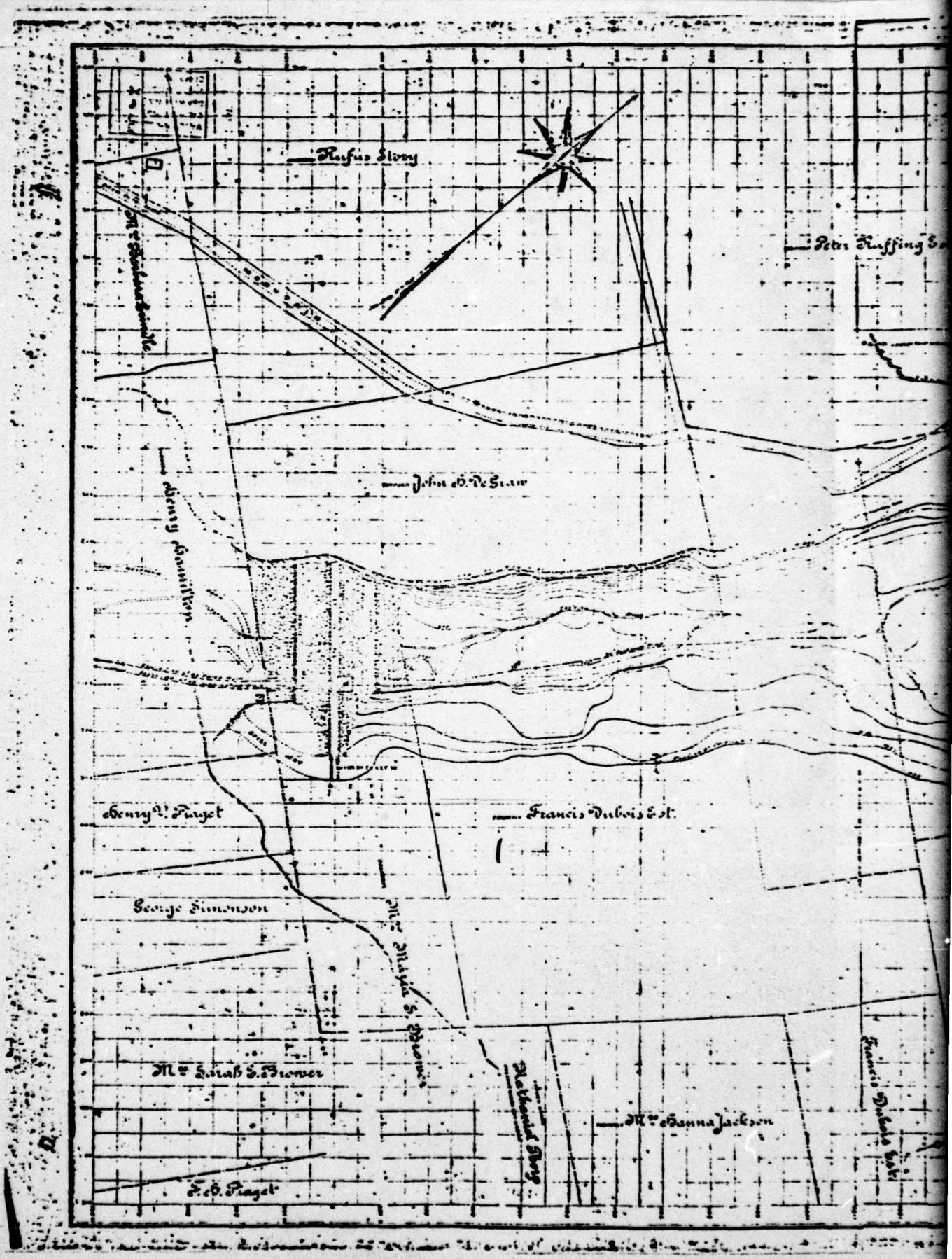
Section.



Note: Details of Manhole Cap Dampers &c. on Sheet No. 1.25.14.

VAULT NO.
CABINET NO
DRAWER NO
SHEET NO
COMP NO.

100.


Rufus Story
Peter Ruffing
John D. DeGraw
Henry Hamilton
Henry R. Piget
Francis Dubois Est.
George Simonson
Mrs Sarah S. Brewer
Nathaniel Berry
Mrs Johanna Jackson
Francis Dubois Est.
Wm. B. Piget

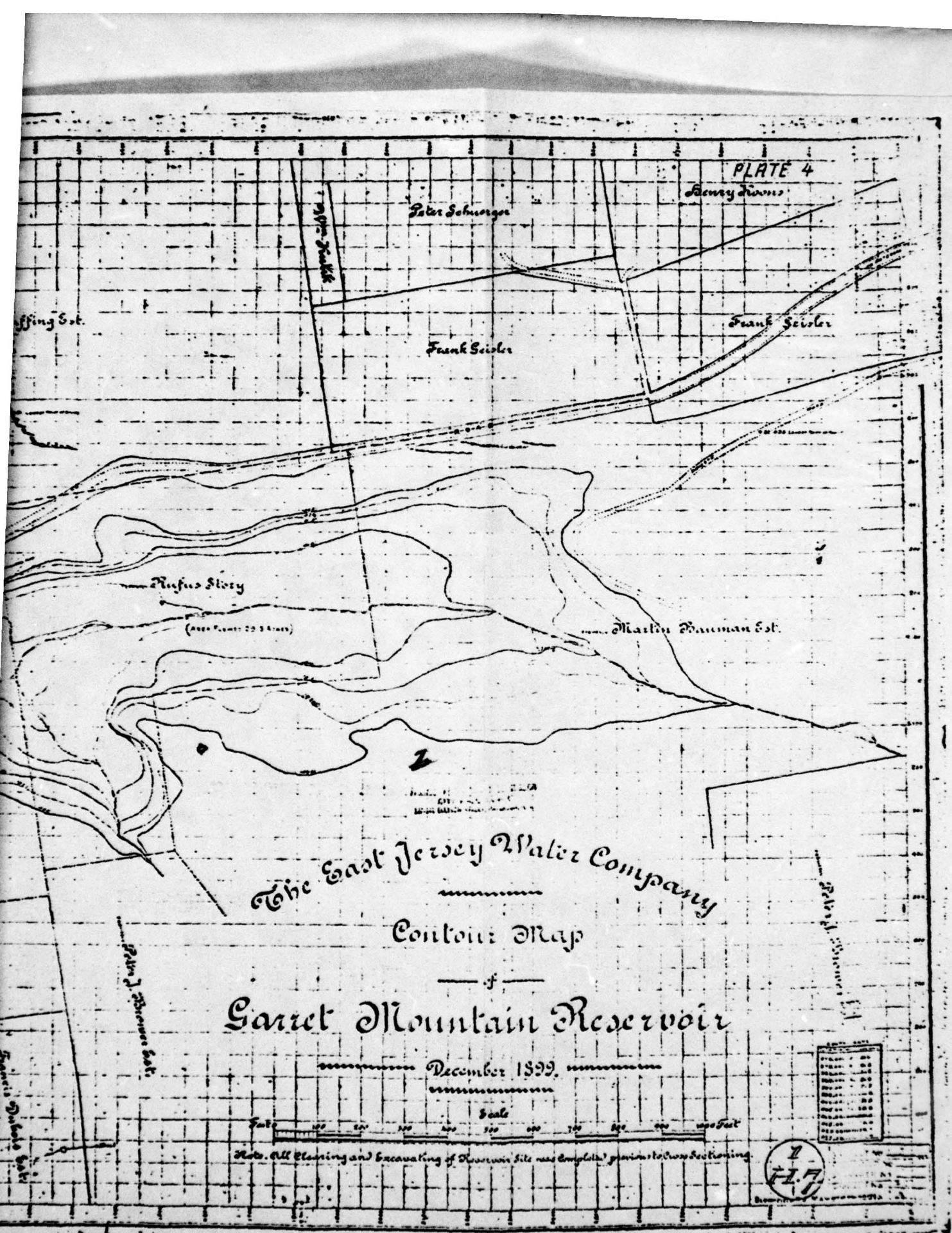


PLATE 4
Peter Schwenger
Frank Seisler
Frank Seisler
Rufus Story
Martin Bauman Est.
The East Jersey Water Company
Contour Map
of
Garret Mountain Reservoir
December 1899.
Scale
Feet
Note. All Planning and Excavating of Reservoir Site was Completed previous to Cross Sectioning.

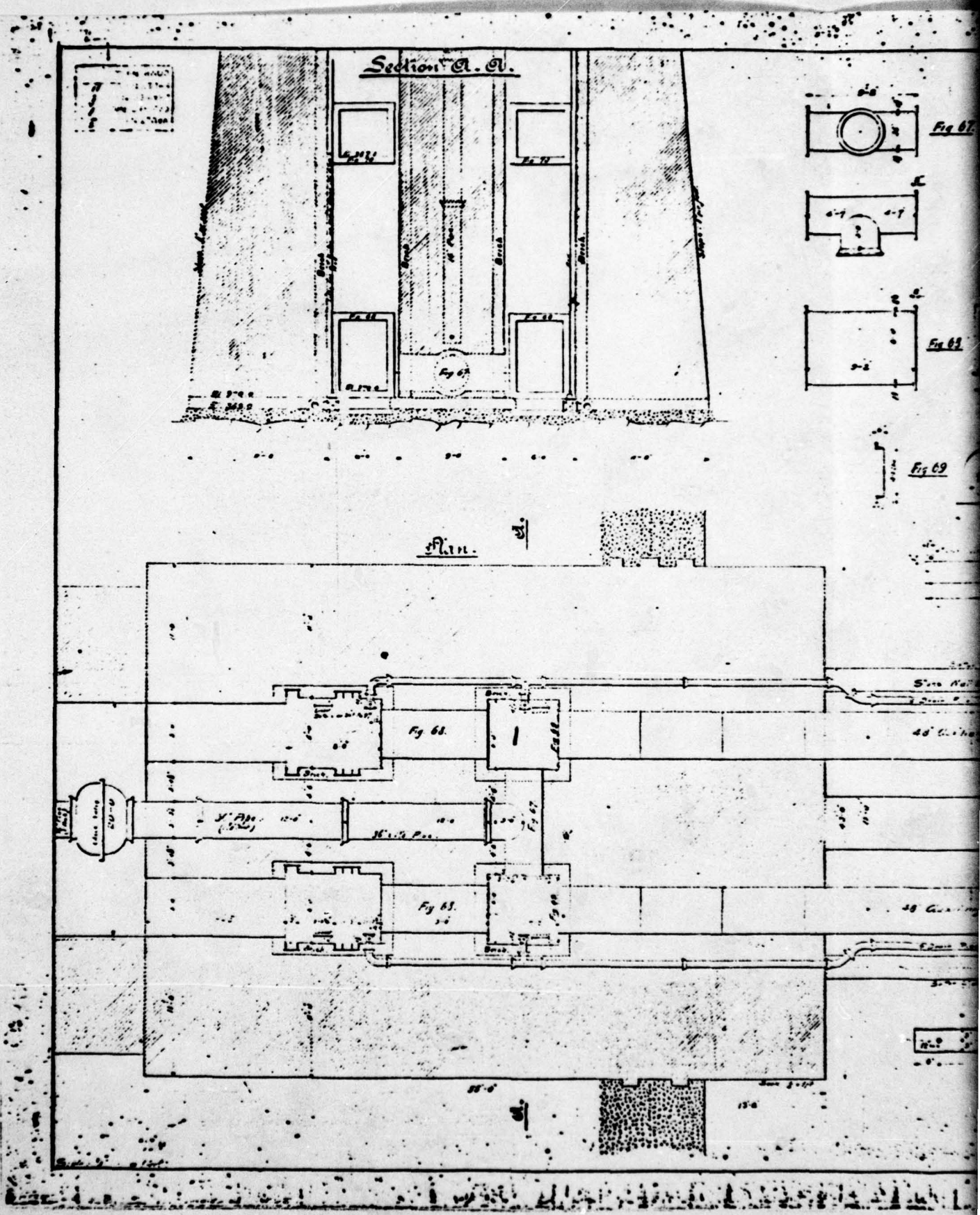

Section A. B.
Fig 67
Fig 68
Fig 69
Plan.
Fig 64.
Fig 67
Fig 63.

PLATE 5 Sheet No 101.

Bill of Materials

No. of Item	Description	Mark	Length
1	36"×36"×36" T. P. & B.	Fig 67	0'-0
2	48"×72" B. Plate	" 68	0'-0
3	48" Flange	" 69	0'-0
4	48" B. Pipe	" 70	0'-0
5	"	" 71	7'-0
3	36"-30° Bend	-	10'-0
1	36" Close Nipple	-	-
6	6" Gate	-	-
8	6" Bell Nipple		
2	6"×6"×6" T.		
20	6"-30° Pipe		12'-0
4	6"-45° Bends		
3	6"-90° C	C 36	2'-0
2	6"-[illegible]	C 37	0'-0

Make 1 Rod Brace as shown.

Fig 70 & 71

Tool's Elevation.

The East Jersey Water Company.

Plan of Gate House & location of Mains & Drain Pipes

Great Notch Reservoir

May 1899.

VAULT NO.
CABINET NO.
DRAWER NO.
SHEET NO.
COMP. NO.

I
Ex. 15

101.

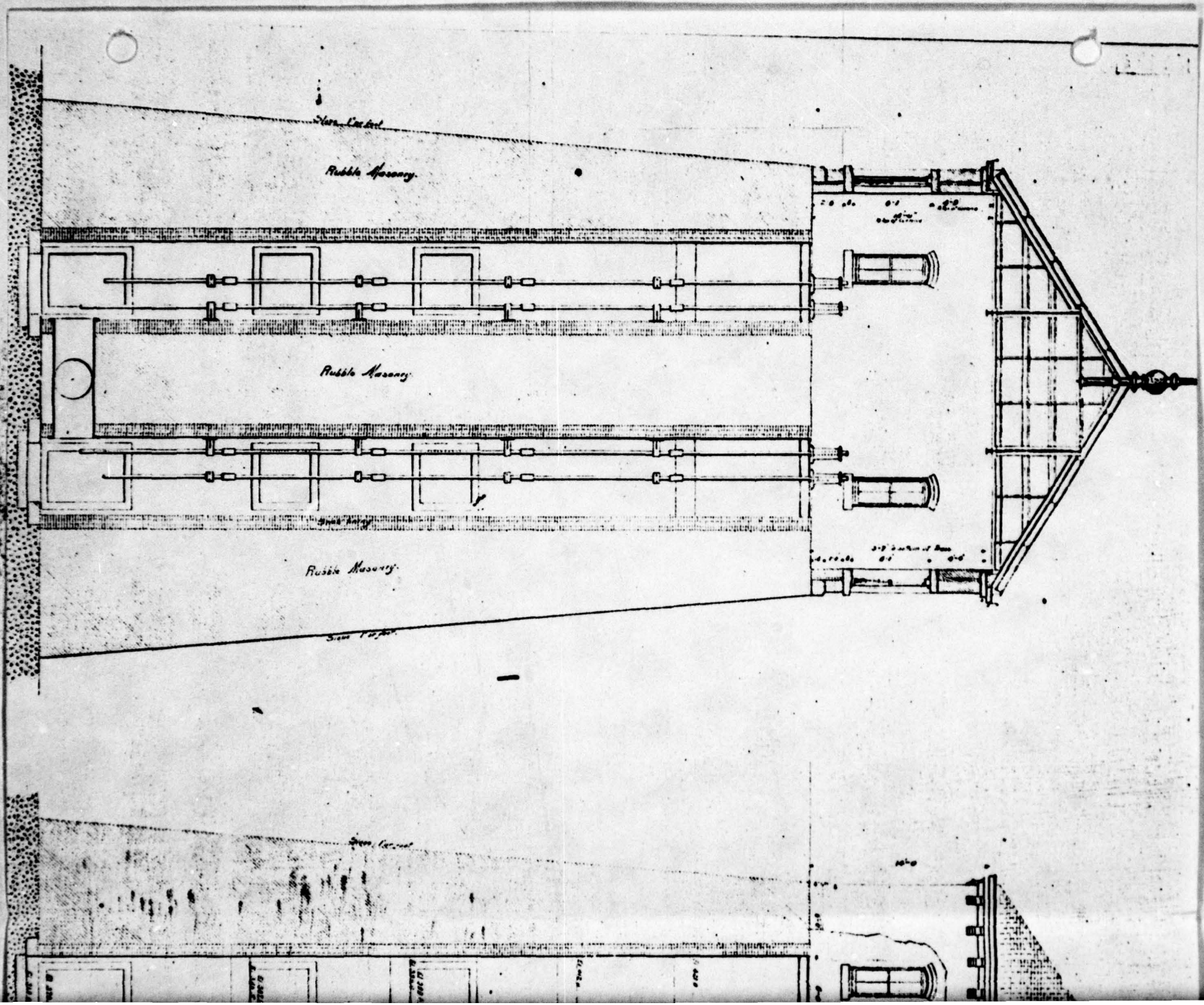

Rubble Masonry
Rubble Masonry
Rubble Masonry

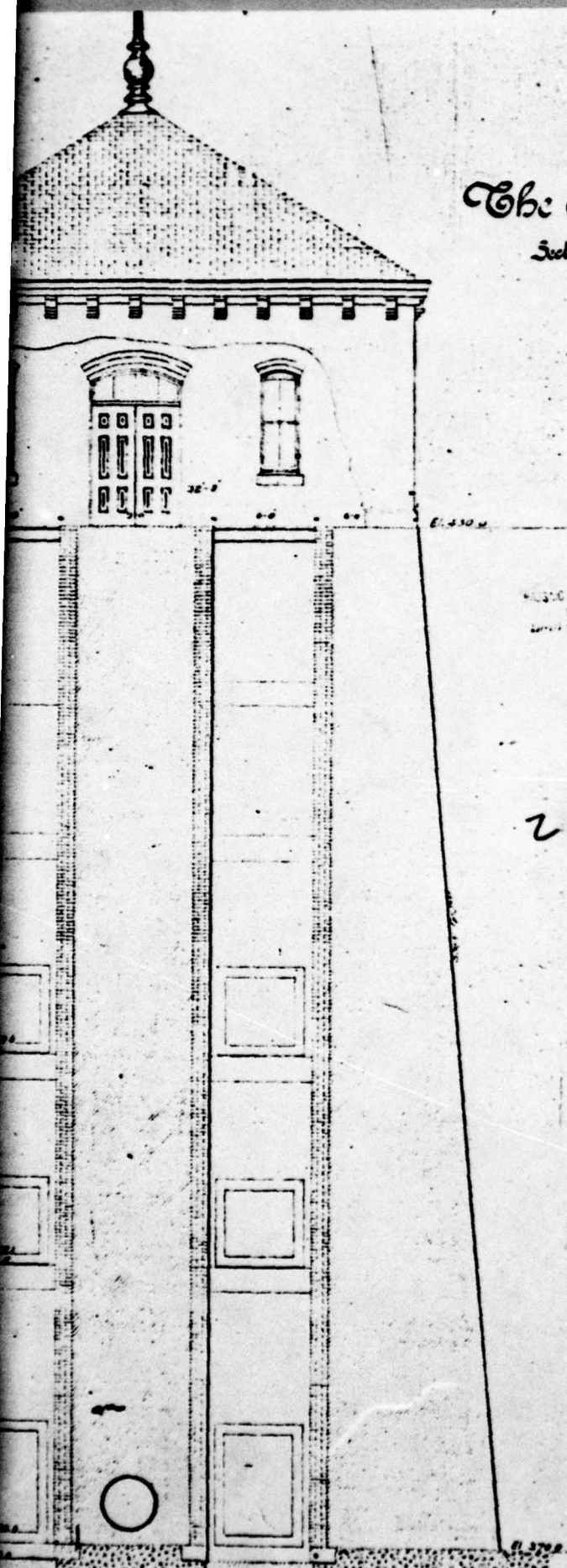
PLATE 6 Sheet No 146.

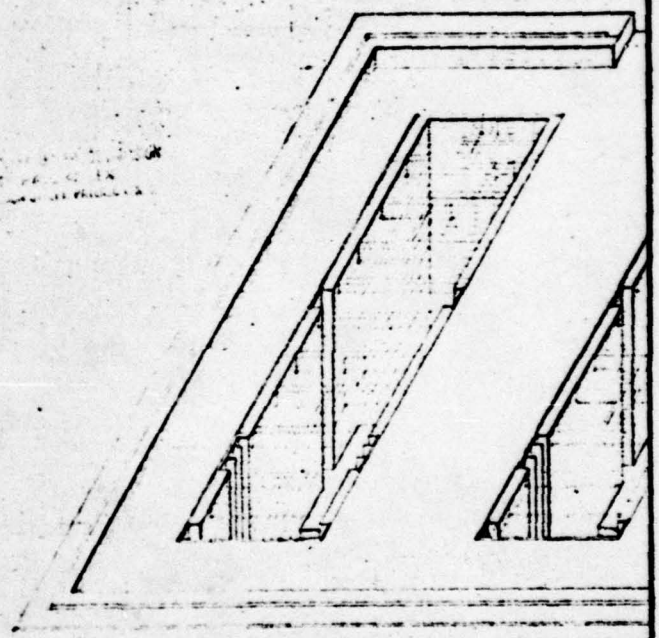
The East Jersey Water Company.

Section & Elevation of Gate House for Great Notch Rg

Garrett Mountain Reservoir.

October 1899.





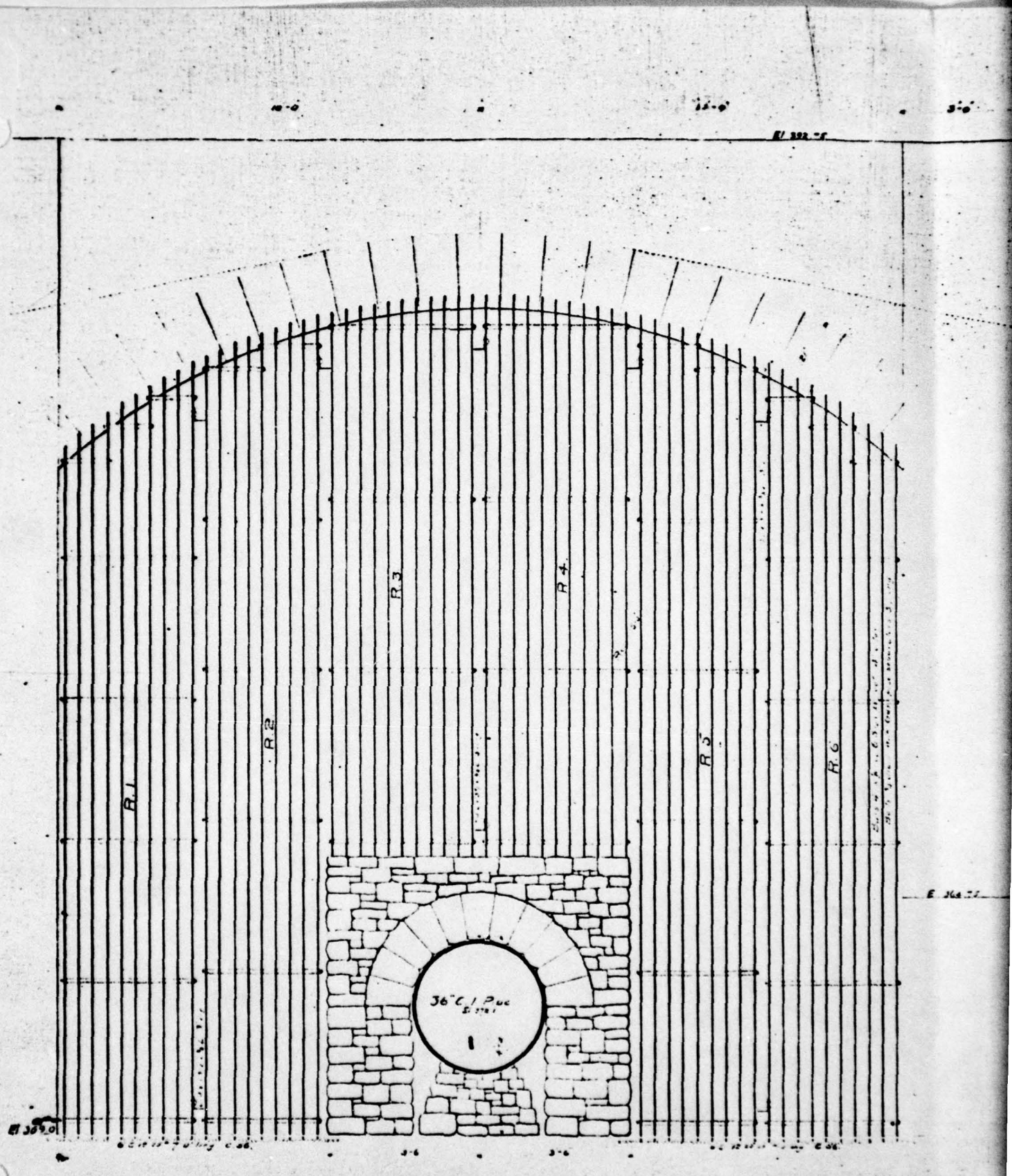

R1
R2
R3
R4
R5
R6
36" C.I. Pipe

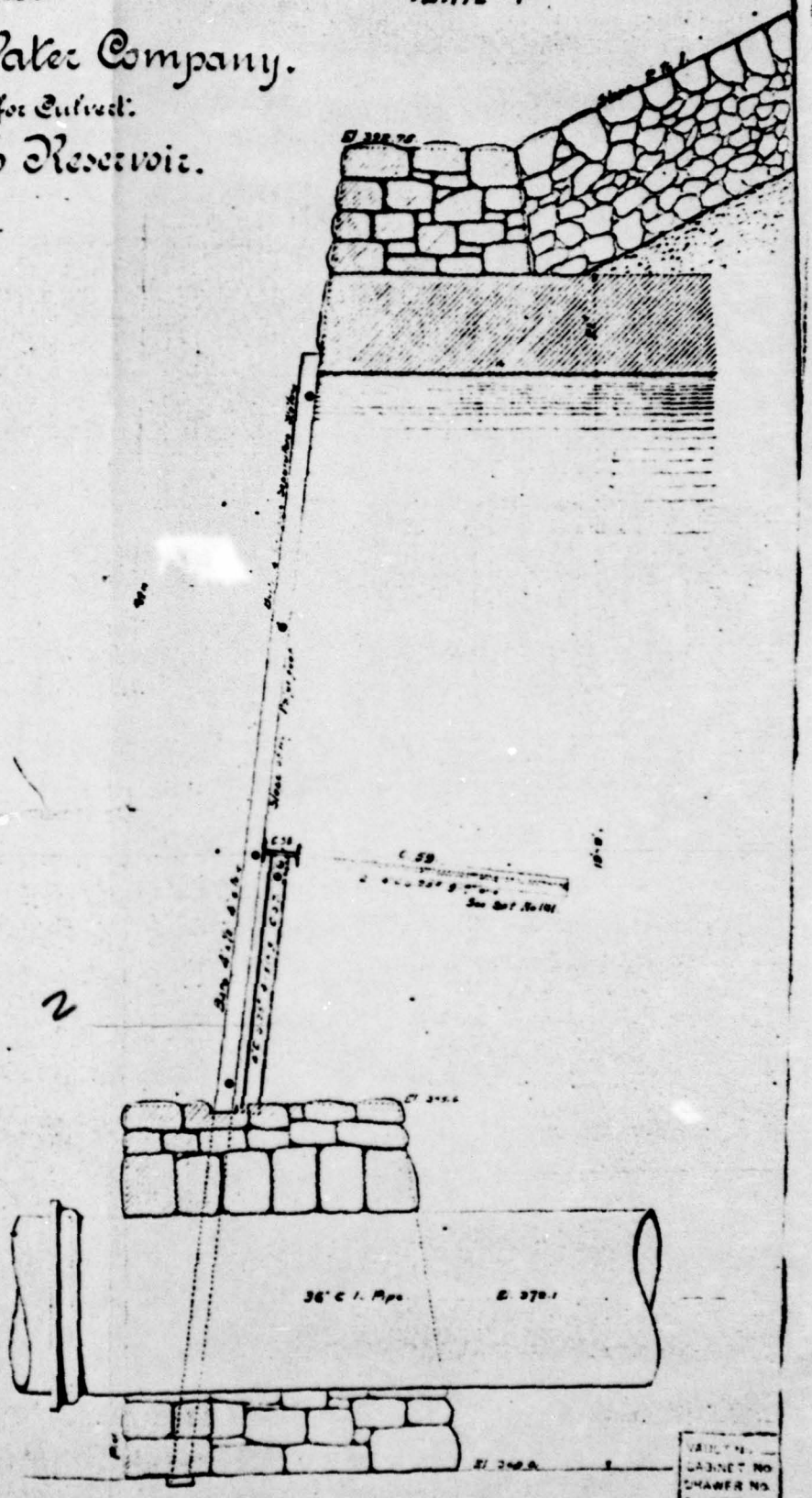
PLATE 7

The East Jersey Water Company.

Details of Rack for Culvert.

Great Wolfe Reservoir.

June 1899.



VAULT No.
CABINET No.
DRAWER No.
SHEET No.
CONTR No.

1
FIG. 16.

133.

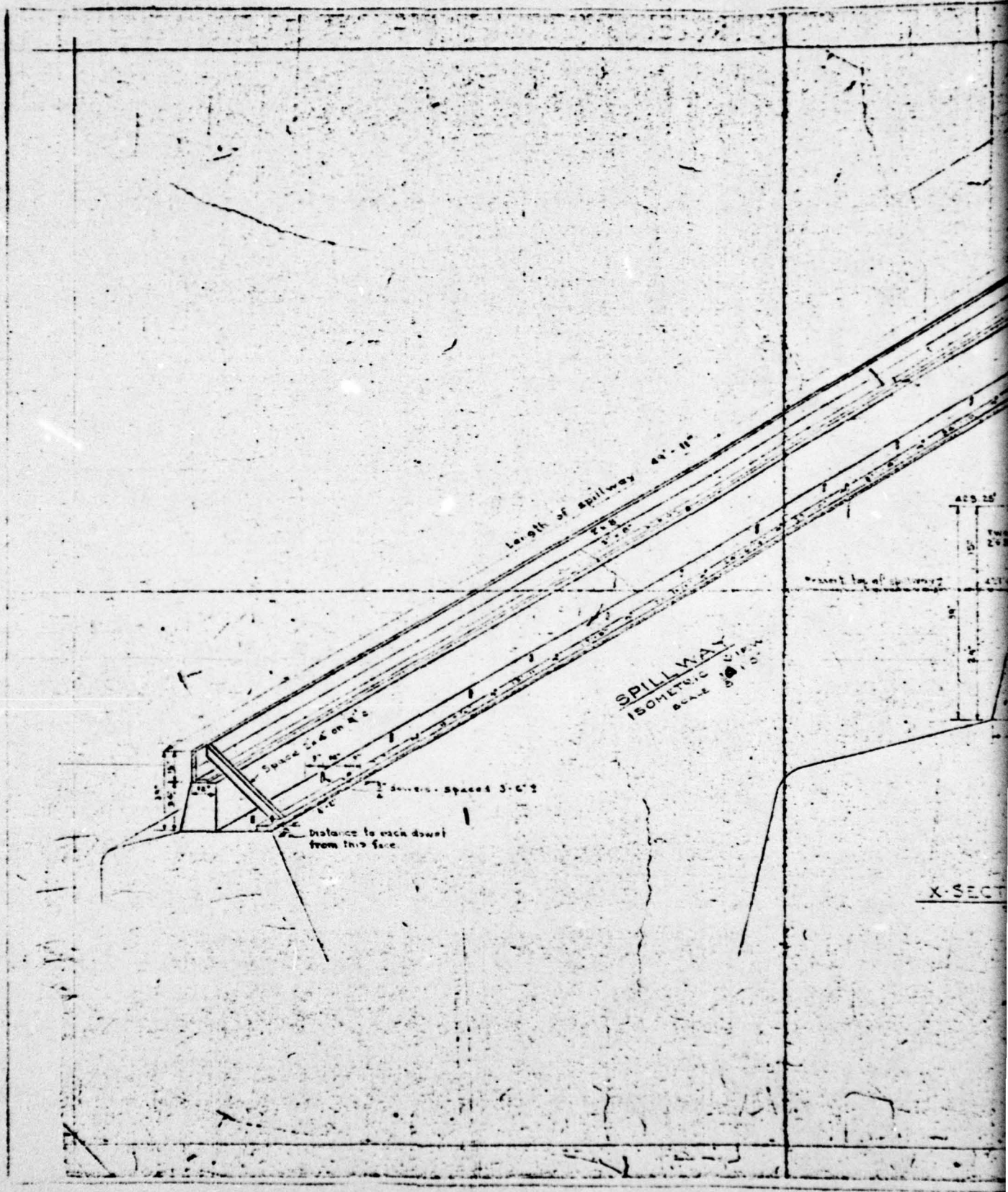
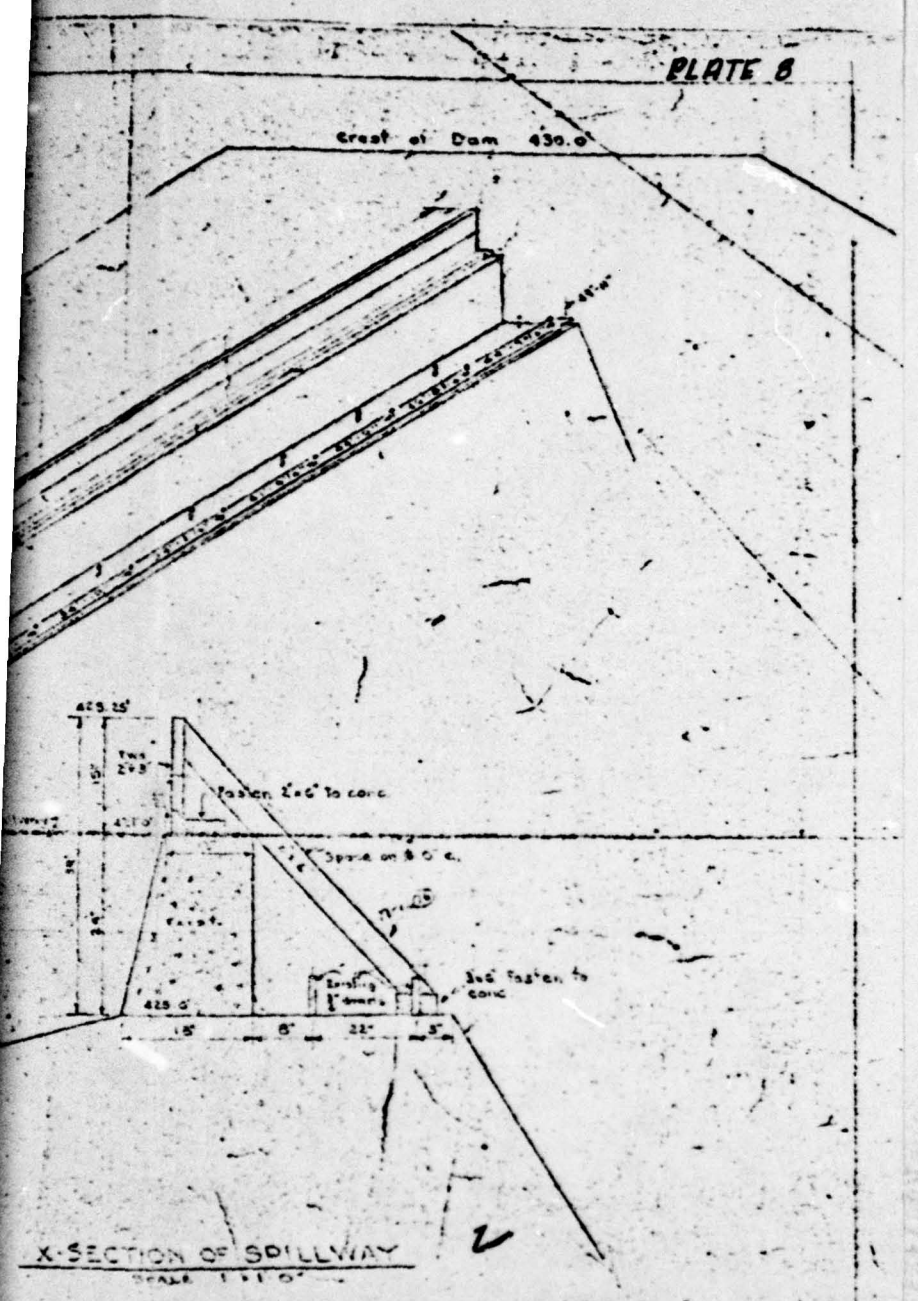

Length of spillway 44'-11"
SPILLWAY
ISOMETRIC
Distance to rock dowel from this face
X-SECT

PLATE 8



PASSAIC VALLEY WATER COMMISSION
ENGINEERING DEPT. CLIFTON, N.J.

PLAN OF PROPOSED CONSTRUCTION OF FLASH BOARDS TO RAISE ELEVATION OF CREST NOT IN RESERVOIR FROM 427 FT. TO 428.25 FT.

SCALE AS NOTED ... OF ... DG MAP SH 1162

No Dam Inspection

24-30

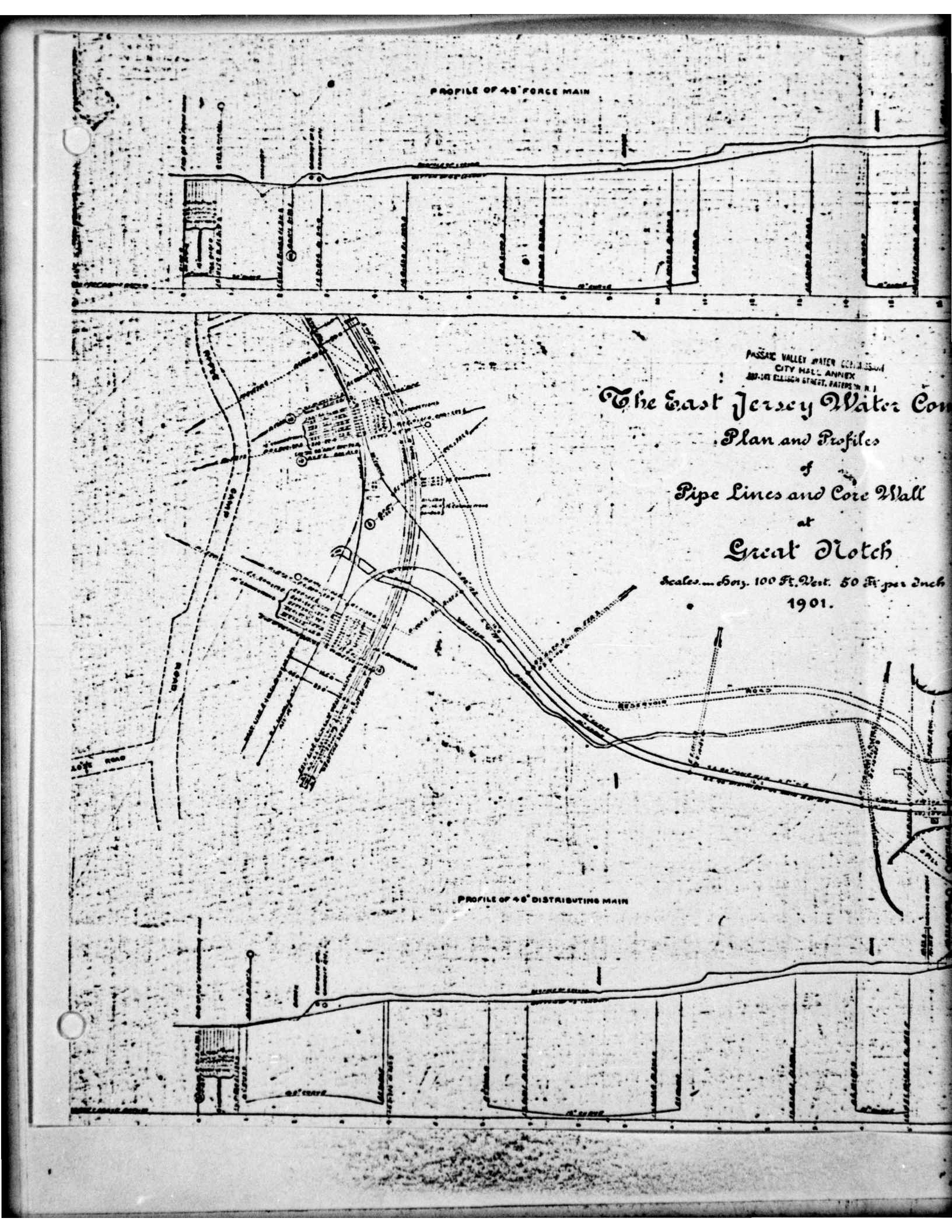
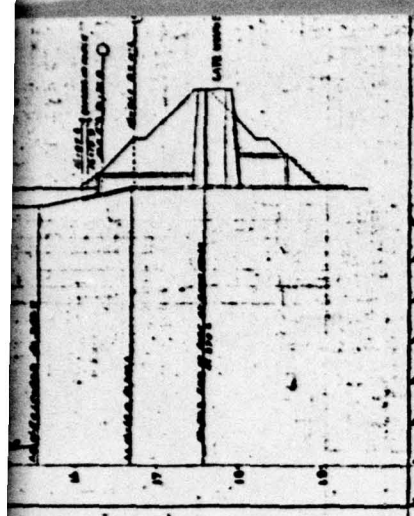
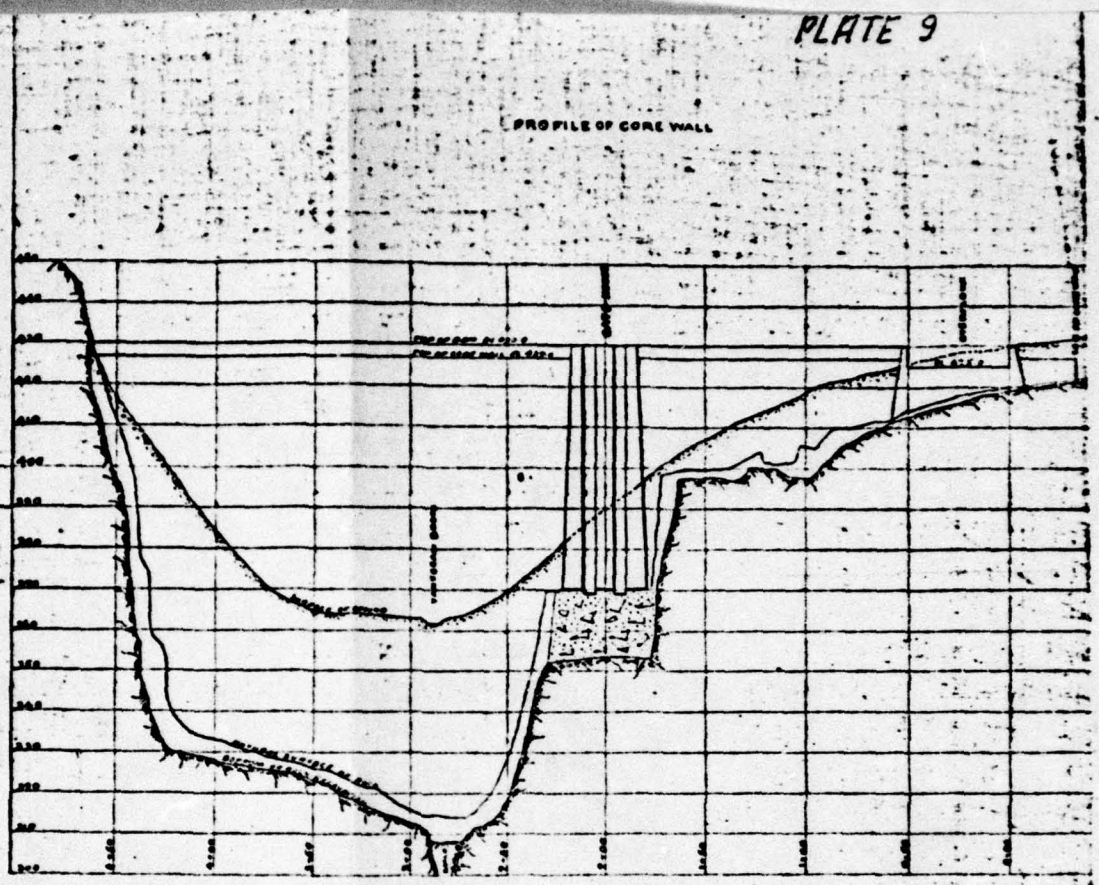

PROFILE OF 48" FORCE MAIN
PASSAIC VALLEY WATER COMMISSION
CITY HALL ANNEX
189-191 ELLISON STREET, PATERSON N.J.
The East Jersey Water Co
Plan and Profiles
of
Pipe Lines and Core Wall
at
Great Notch
Scales — Horz. 100 Ft. Vert. 50 Ft. per Inch
1901.
RESERVOIR ROAD
PROFILE OF 48" DISTRIBUTING MAIN

PLATE 9



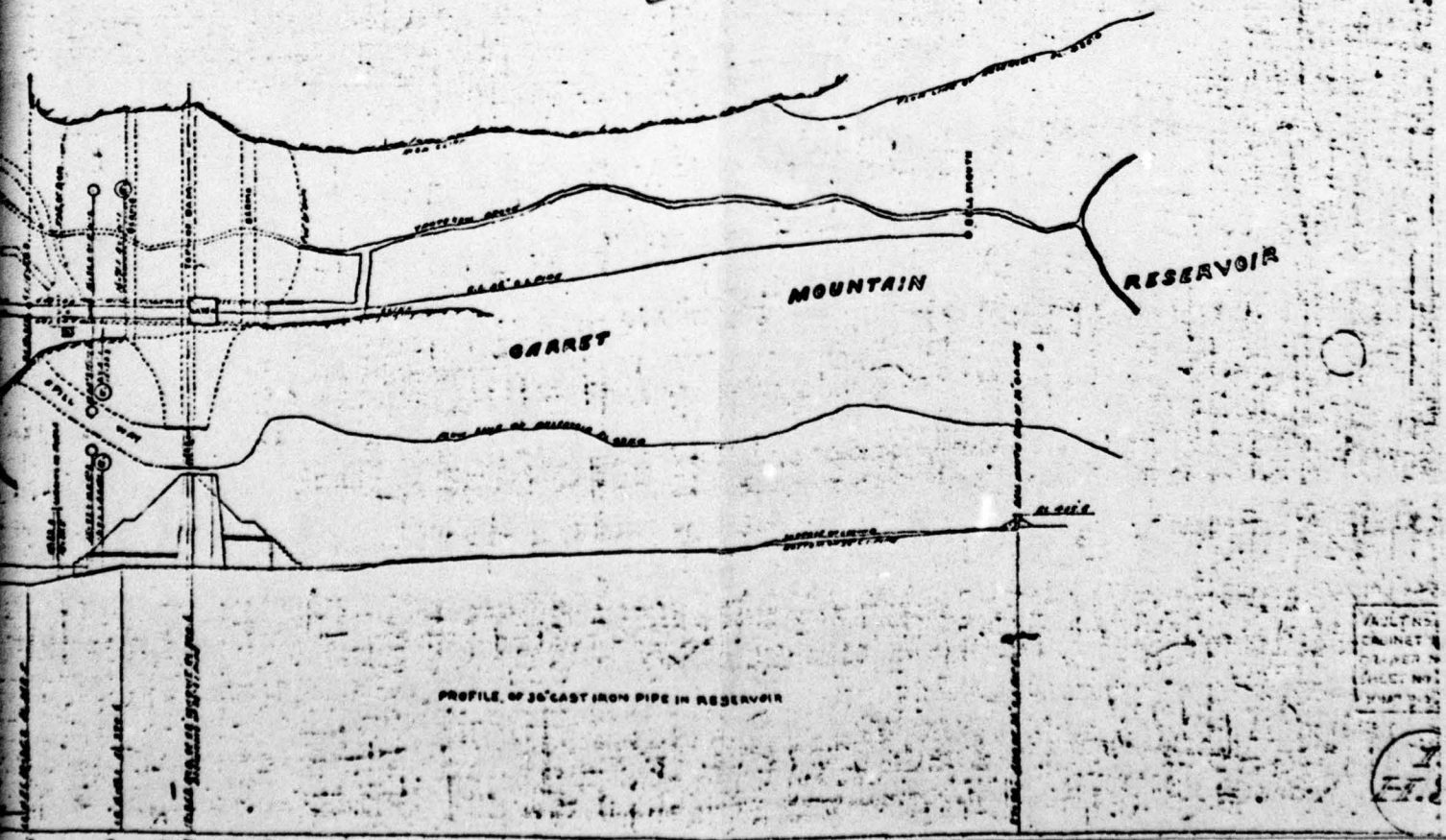


Company

all

inch

2



PROFILE OF 36" CAST IRON PIPE IN RESERVOIR

APPENDIX A

CHECK LIST - VISUAL OBSERVATIONS

CHECK LIST - ENGINEERING, CONSTRUCTION, MAINTENANCE DATA

Check List
Visual Inspection
Phase 1

Name Dam Great Notch County Passaic State New Jersey Coordinator NJDEP

Coordinates: Lat. 40° 52' 48"N
Long. 74° 11' 37"W

Date(s) Inspection Dec.2,1978 Weather Overcast Temperature 42°F

Pool Elevation at Time of Inspection 425' M.S.L. Tailwater at Time of Inspection N.A. M.S.L.

Inspection Personnel:

(December 2, 1978)
R.C. Gaffin

A.L. Slaughter

P.L. Wagner

(December 20, 1978)
R.J.Jenny

D.J. Lachel

F.L. Panuzio

(December 20, 1978)
A.L. Slaughter

P. L. Wagner Recorder

Owner Representatives:

(December 2, 1978)
Anthony Seeman

George Bednarz

(December 7, 1978)
Leo Calligaro

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Not Applicable	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Not Applicable	
DRAINS	Not Applicable	
WATER PASSAGES	Not Applicable	
FOUNDATION	Not Applicable	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBERSVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Not Applicable	
STRUCTURAL CRACKING	Not Applicable	
VERTICAL AND HORIZONTAL ALIGNMENT	Not Applicable	
MONOLITH JOINTS	Not Applicable	
CONSTRUCTION JOINTS	Not Applicable	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Concrete sill with wood flashboards 1-ft. height in place.	
APPROACH CHANNEL	Stone masonry wing walls.	
DISCHARGE CHANNEL	Steep-sided natural channel, heavily wooded. Drains to area behind rock outcrop at base of left abutment and thus is well separated from face of dam. Possible seepage noted just downstream of spillway weir.	Chain link fence immediately downstream of spillway could trap debris and impede flow through spillway.
BRIDGE AND PIERS	None	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed. Downstream face of dam is surfaced with 12-in. to 16-in. sub-rounded boulders. Generally even surface. Above bench the rock surfacing appears to be hand-placed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	A surface drain has been excavated at toe on right side of the embankment.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Apparent slide of downstream rock facing near right abutment; 20 ft. wide by 50 ft. downslope, where larger surface rocks have slid downslope. Small trees have grown in this area. Other slopes of facing material are fairly even except for minor swales..	Trees should be cut and rock facing replaced in denuded area.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	No discernable misalignment.	
RIPRAP FAILURES	None. Upstream riprap appears to be in good condition above waterline.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	Small (2-in. dia.) birch trees at scattered locations on downstream embankment, but heavy growth along embankment bench.	Trees should be removed.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Lower left abutment is large outcrop of quartzite separating spillway channel from downstream face of dam.	
ANY NOTICEABLE SEEPAGE	Possible seepage at base of spillway.	
STAFF GAGE AND RECORDER	Staff gage and float gage in gate house with records at Little Falls pump station.	Continuous records kept by owner.
DRAINS	None.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Steel outlet pipe coated with 3-inch concrete. No cracks or spalling observed.	
INTAKE STRUCTURE	6 sluice gates operated individually. Gates seldom operated. Pumped water flows through 48-in. steel pipe in right tunnel below gate house.	Owner is reluctant to change operation of sluice gates because of their age.
OUTLET STRUCTURE	Releases flow through 48-in. pipe in left tunnel below gate house. Tunnels are about 9 ft. diameter with concrete arches and masonry walls. Minor seepage through arch of outlet tunnel. Also minor seepage on outside wall of tunnel facing.	Valve controlling 48-inch outlet pipe should be regularly operated.
OUTLET CHANNEL	Not applicable	
EMERGENCY GATE	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not Applicable	
APPROACH CHANNEL	Not Applicable	
DISCHARGE CHANNEL	Not Applicable	
BRIDGE AND PIERS	Not Applicable	
GATES AND OPERATION EQUIPMENT	Not Applicable	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	Survey monuments reported but not observed.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	Continuous recording of water levels from float gage in gate house.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Vertical rock slopes on right side of reservoir. Moderate slopes, wooded parkland area on left. Some debris potential.	
SEDIMENTATION	Very clean (treated water).	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Generally wooded area. No well defined stream channel.	
SLOPES	Abutments at base of dam are hard, slabby, very steep sandstone. Below dam the slopes are moderate and not contained within a well defined valley.	
APPROXIMATE NO. OF HOMES AND POPULATION	Major highway about 1/3 mile downstream. Major population centers further downstream, portions of which would be within flood area.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	"Contour Plan of Dam Site for Great Notch Reservoir", April 1899, Scale: 1" = 20' (See Plate 2).
REGIONAL VICINITY MAP	U.S. Geological Survey topographic maps (See Plate 1).
CONSTRUCTION HISTORY	Some history available from correspondence on file with the State Dep, plus plans obtained from owner.
TYPICAL SECTIONS OF DAM	"Plan and Section of Gate House and Main Dam, Great Notch Reservoir", August 1899, Scale: 1/8" = 1'0" (See Plate 9). "Pipe Lines and Core Wall at Great Notch", 1901, Scales: 1" = 100' Horiz., 1" = 50' Vert. (See Plate 4).
HYDROLOGIC/HYDRAULIC DATA	Reservoir contours and elevation capacity chart on "Contour Map of Garrett Mountain Reservoir", December 1899, Scale: 1" = 100' (See Plate 4).
OUTLETS - PLAN - DETAILS -CONSTRAINTS -DISCHARGE RATINGS	"Details of Rack for Culvert, Great Notch Reservoir", June 1899, Scale:3/4" = 1'0" (Trash rack at base of gate house) (See Plate 7). "Plan of Gate House and Location of Main and Drain Pipes, Great Notch Reservoir", May 1899, Scale: 1/4" = 1'0" (See Plate 5).
RAINFALL/RESERVOIR RECORDS	Continuous records of reservoir levels available from owner.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	None available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available. Depth to rock indicated on Plate 9.
POST-CONSTRUCTION SURVEYS OF DAM	None available
BORROW SOURCES	No records available. Plans indicate some or all of borrow material was from reservoir excavation (See Plate 4).

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
SPILLWAY-PLAN -SECTIONS -DETAILS	"Plan of Proposed Construction of Flash Boards to Raise Elevation of Great Notch Reservoir from 427 ft. to 428.25 ft.", March 26, 1962, Scales: 3/8" = 1'0" and 1" = 1'0" (See Plate 8).
OPERATING EQUIPMENT PLANS & DETAILS	See Sheet 1, "Outlets".
MONITORING SYSTEMS	Have float gage and recorder. Reportedly have survey monuments on dam.
MODIFICATIONS	See remarks above on Spillway. Also have "Plan of Reinforcement 48" Steel Conduits in Pipe Tunnels below Dam, Great Notch Reservoir", March 1951.
HIGH POOL RECORDS	Records available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Limited data available in State files.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
MAINTENANCE OPERATION RECORDS	None available

APPENDIX B

PHOTOGRAPHS

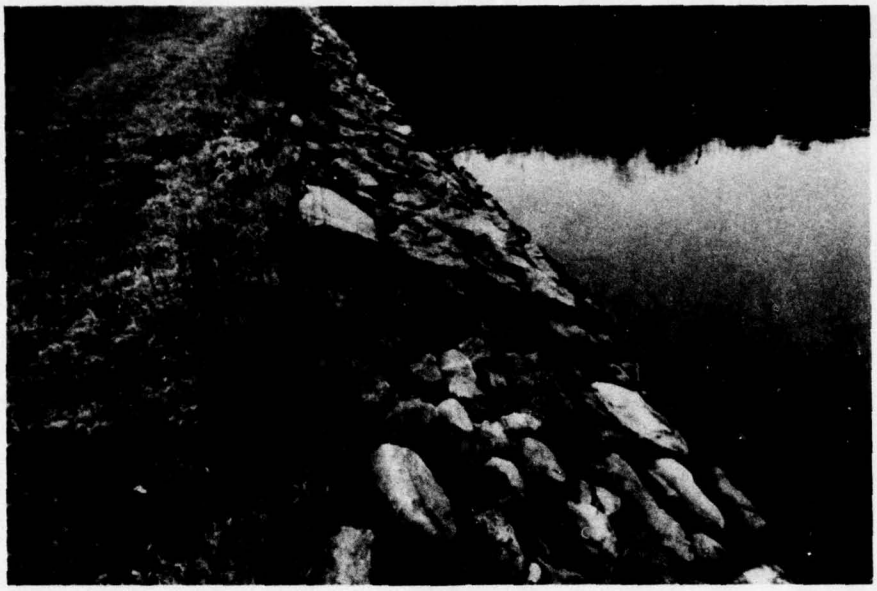


Photo 1 - Rock riprap extends to the crest of the embankment. (12-2-78)

Photo 2 - Hand-placed rock facing above the downstream embankment bench. (12-2-78)

Photo 3 - Dumped rock fill facing below the downstream embankment bench. (12-2-78)

Photo 4 - Rock facing denuded by a slide on lower right side of downstream embankment. (12-2-78)

Photo 5 - Heavy growth of trees along downstream embankment bench. (12-2-78)

Photo 6 - Rock ledge on lower left abutment separating dam embankment (left) from the spillway channel (to right of photo). (12-2-78)

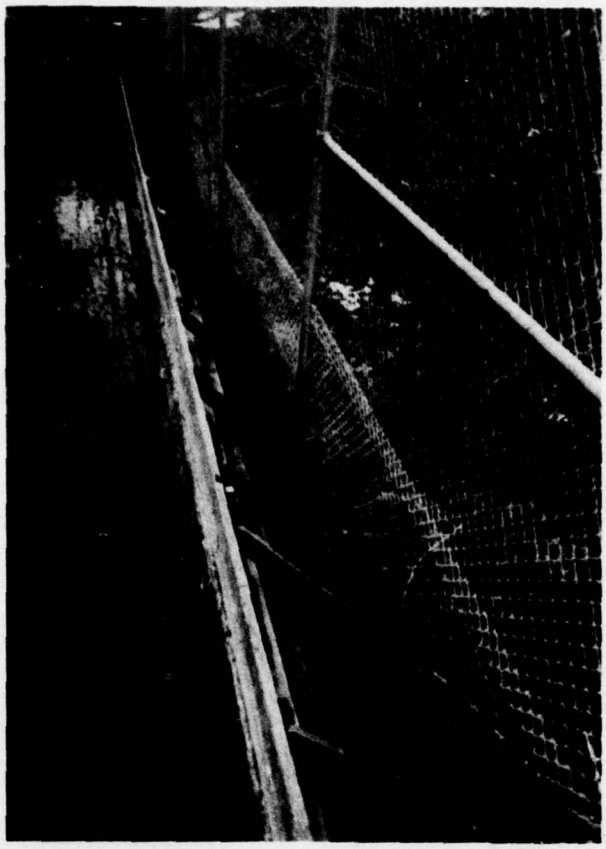


Photo 7 - Spillway crest and installed flashboards. (12-2-78)

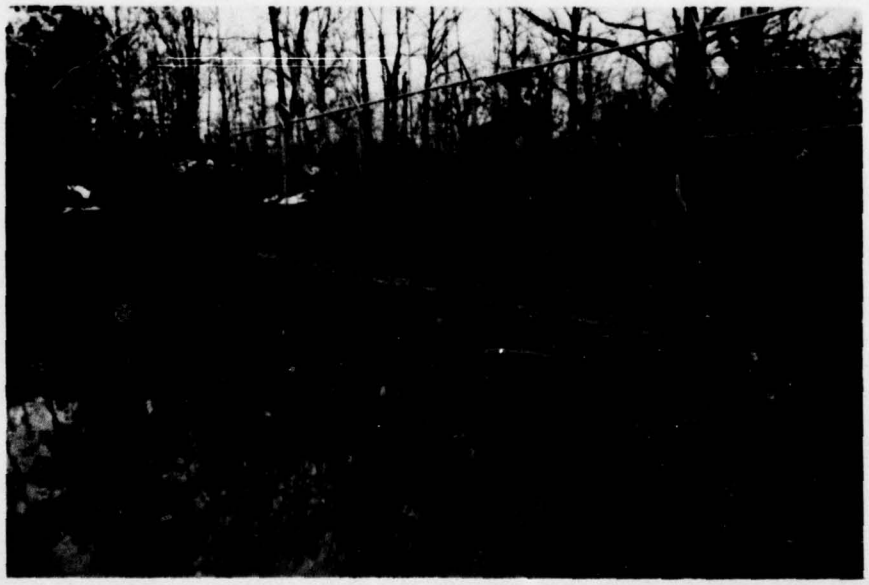


Photo 8 - Spillway, looking toward left abutment. Note close proximity of downstream chain-link fence. (12-2-78)

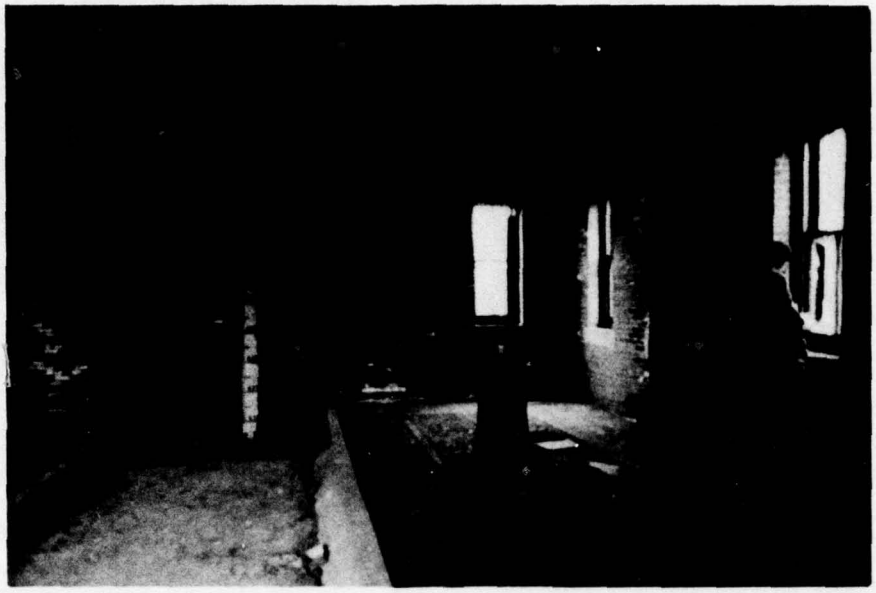


Photo 9 - Inside of gate house, showing gate controls, staff gage and float gage. (12-2-78)

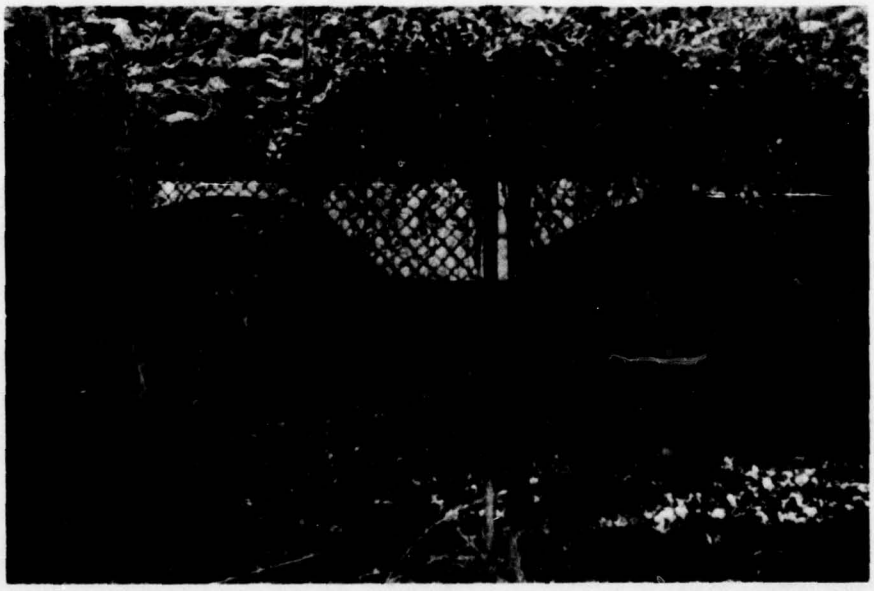


Photo 10 - Entrance of tunnels housing force main (left) and distribution main (right). (12-2-78)

Photo 11 - Right bank of reservoir looking northwest from the dam. (12-2-78)

Photo 12 - Left bank of reservoir looking northeast from the dam. (12-2-78)

APPENDIX C

REGIONAL GEOLOGY - PIEDMONT LOWLANDS

REGIONAL GEOLOGY - PIEDMONT LOWLANDS

Physiography

The Piedmont Lowlands Province of New Jersey lies northwest of a line approximately between Trenton and Perth Amboy and southeast of an approximate line between Milford on the Delaware River and Mahwah near the New York State border. Physiographically, the province is situated between the predominantly Precambrian age New Jersey Highlands Province to the northwest and the typically unconsolidated Creataceous age and younger sediments of the Coastal Plain Province to the southeast. (See Figure C-1).

Bedrock

The Piedmont Lowlands, encompassing about one-fifth of the state, is characterized by northwestward dipping bedrock composed of interbedded red shales, siltstones and sandstones of Triassic and Jurassic age and igneous basalt extrusions (lava flows) and diabase intrusions of Jurassic age. The sedimentary rocks have been eroded to a broad southeastward sloping piedmont plain. The northwest border of the province is a northeast-southwest trending fault zone (Ramapo Fault) which truncates the sedimentary beds. Total vertical displacement on the fault may reach 10,000 feet.

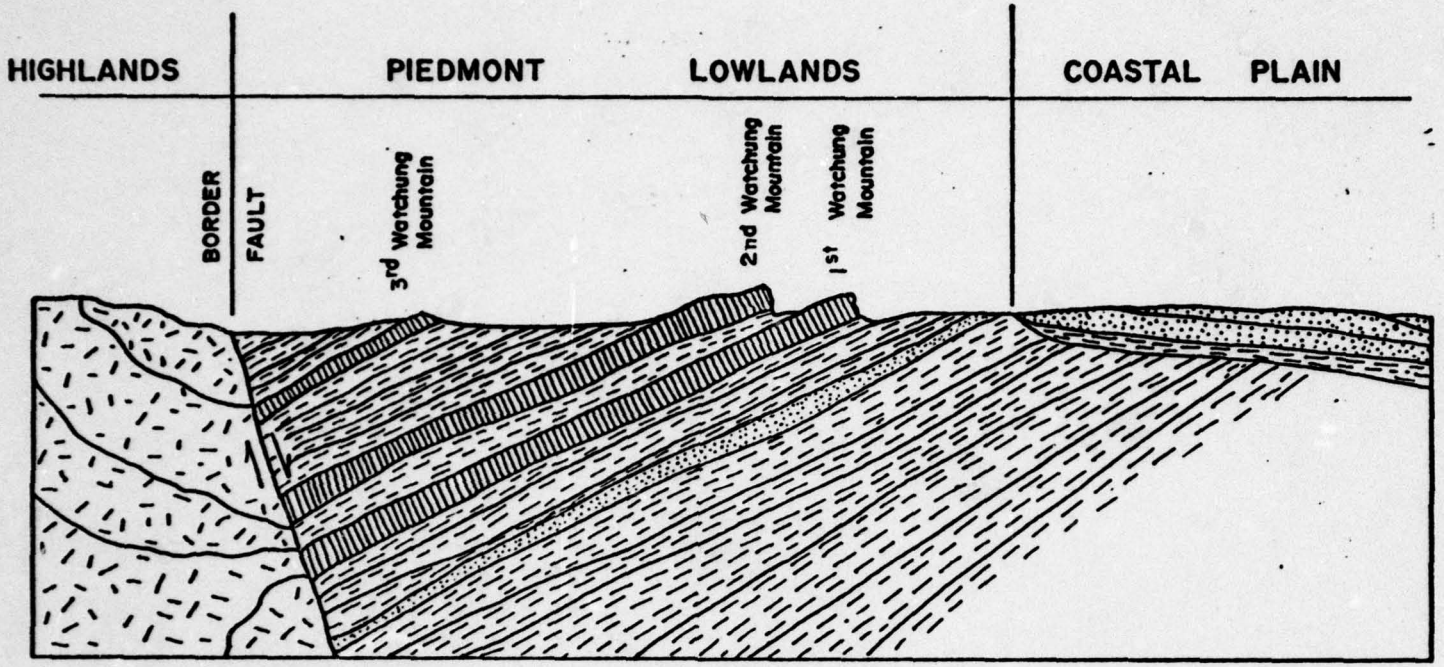
The gently rolling lowland topography of the piedmont lowlands is pierced by long asymetric ridges of hard

and resistant igneous rocks which were intruded into or on top of the sedimentary sequences. With the subsequent erosion of the softer sedimentary rocks, these igneous formations have been left standing, often in bold relief, up to 400 ft. above the surrounding plains. The igneous bodies composed of diabase and basalt form the Palisades along the Hudson River and the three Watchung Mountain ridges of the central Piedmont. The ridges are all steeper on the southeast with gentle dip slopes to the northwest.

Overburden

The Pleistocene Age Wisconsin continental glacier has smoothed and filled approximately the northern half of the province. The terminal moraine of the glacier extends from Perth Amboy to Summit then northwestward to Morris Plains. North of the morainal line the soils characteristically consist of glacial tills overlying the bedrock with scattered overlying stratified outwash deposits. At least three large glacial lakes occupied portions of the area north of the moraine at different periods, resulting in a relatively flat topography composed predominantly of silts and clays.

South of the terminal moraine, most of the overburden consists of alluvial deposits overlying a more highly developed weathered transition zone on top of the bedrock. Some highly weathered tills of pre-Wisconsin glaciation can be found on the top of intervalley ridges. Much of the alluvium is glacial outwash.



Pre-cambrian gneisses, schists and metasediments

Triassic and Jurassic shales, sandstones & siltstones

Lava (Basalt) flows

Cretaceous and younger age unconsolidated deposits

SCHEMATIC CROSS-SECTION OF
NEW JERSEY PIEDMONT LOWLANDS
PHYSIOGRAPHIC PROVINCE

JENNY / LEEDSHILL
JANUARY 1979

FIGURE C-1

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.3 SQ. MI.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 428.25 Ft with Flashboards (580 AF)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A

ELEVATION MAXIMUM DESIGN POOL: 428.25 Ft

ELEVATION TOP DAM: 430 Ft

CREST: SPILLWAY

a. Elevation 428.25 FT (WITH FLASHBOARDS)
b. Type SHARP CRESTED
c. Width —
d. Length 50'
e. Location Spillover LEFT ABUTMENT (LOOKING DOWNSTREAM)
f. Number and Type of Gates 1.25' FLASHBOARDS / CREST ELEV. 428.25

OUTLET WORKS:

a. Type 1-36" C.I. BLOW-OFFF AND 1-48" STEEL SUPPLY MAIN 1-48" FORCE MAIN
b. Location —
c. Entrance inverts —
d. Exit inverts —
e. Emergency draindown facilities —

HYDROMETEOROLOGICAL GAGES: NONE

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 335 CFS WITH FLASHBOARDS

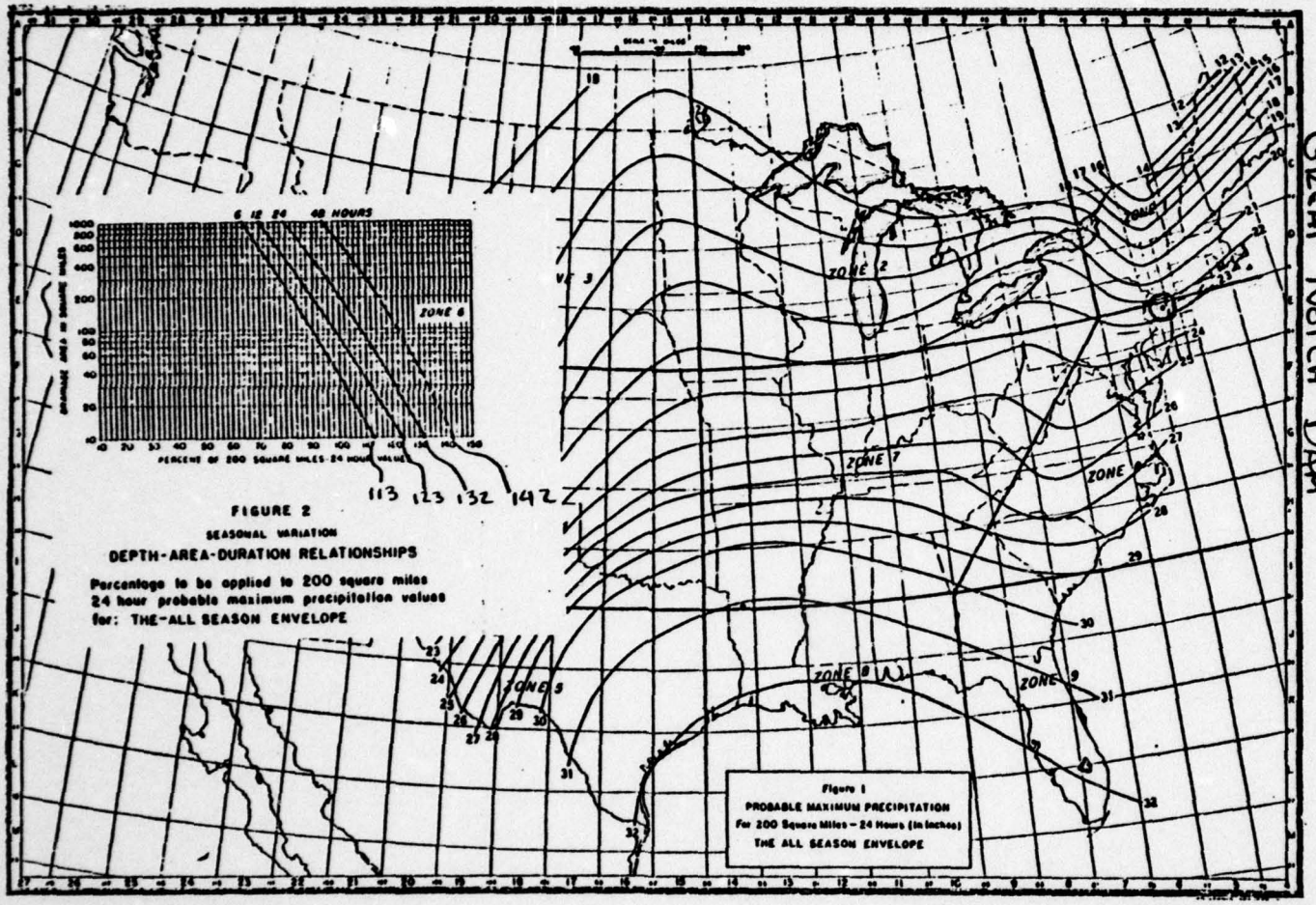


FIGURE 2

SEASONAL VARIATION

DEPTH-AREA-DURATION RELATIONSHIPS

Percentage to be applied to 200 square miles 24 hour probable maximum precipitation values for: THE-ALL SEASON ENVELOPE

D-1

GREAT NOTCH DAM

79 0118

302-07

CHAMPION LINE NO. C33-P LEEDS, HILL AND JEWETT, INC.

BY RBE DATE 781220 CLIENT N.J. SHEET NO. 1 OF 2

CHKD DATE JOB TIME OF CONCENTRATION JOB NO. 302

DATA — GREAT NOTCH

L = STREAM LENGTH FROM WATERSHED OUTLET TO THE MOST DISTANT RIDGE = 0.98 m

L_{CA} = STREAM LENGTH FROM BASIN CENTROID = 0.38 m

H = DIFF BETWEEN ELEV AT OUTLET AND ELEV AT MOST DISTANT POINT = 550 − 360 = 190

T_C = TIME OF CONCENTRATION OR TIME FOR WATER TO FLOW FROM THE MOST DISTANT POINT IN THE WATERSHED TO THE WATERSHED OUTLET

T_L = LAG TIME FROM CENTER OF EXCESS RAINFALL TO TIME OF PEAK. = $0.6\,T_C$

METHOD 1 — $T_C = \dfrac{L^{1.15}}{7700\,H^{0.38}}$ L IN FT, H IN FT

$T_L = \dfrac{0.6\,L^{1.15}}{7700\,H^{0.38}}$

METHOD 2 — $T_C = \left(\dfrac{11.9\,L^3}{H}\right)^{0.385}$ L IN MILES, H IN FT.

$T_L = 0.6\left(\dfrac{11.9\,L^3}{H}\right)^{0.385}$

METHOD 3 — $T_L = C_T\left(\dfrac{L\,L_C}{S^{1/2}}\right)^{0.38}$ S IN FT/MI $S = H/L = 3.678$

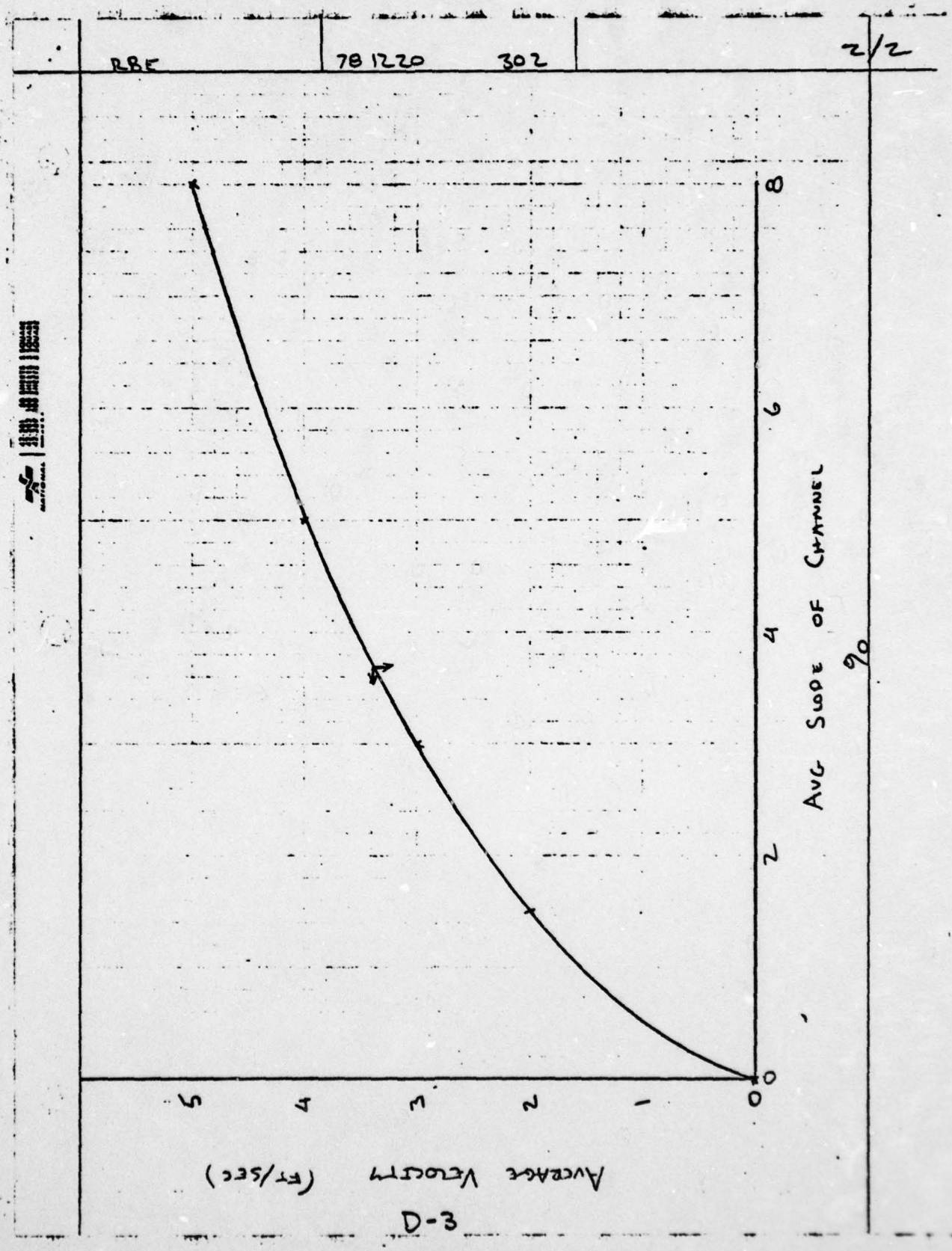
$T_L = C_T\left(\dfrac{L\,L_C}{(H/L)^{1/2}}\right)^{0.38}$ C_T = 1.2 (0.77) MOUNTAIN, = 0.35 FOOTHILL VALLEY DRAINAGE AREA

METHOD 4 — $T_C = L/V$ V = AVG VELOCITY FROM CURVE OF V VS, AVG SLOPE

$T_L = 0.6\,L/V$ V = 3.4 fps

DATA	LAG IN HOURS METHODS				
	1	2	3	4	USE
Great Notch	0.2	0.2	0.2	03	0.2

RBE | 78 1220 | 302 | 2/2



D-3

AD-A069 218 NEW JERSEY STATE DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/2
NATIONAL DAM SAFETY PROGRAM. GREAT NOTCH RESERVOIR (NJ 00244). --ETC(U)
APR 79 R J JENNY DACW61-78-C-0124

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2 OF 2
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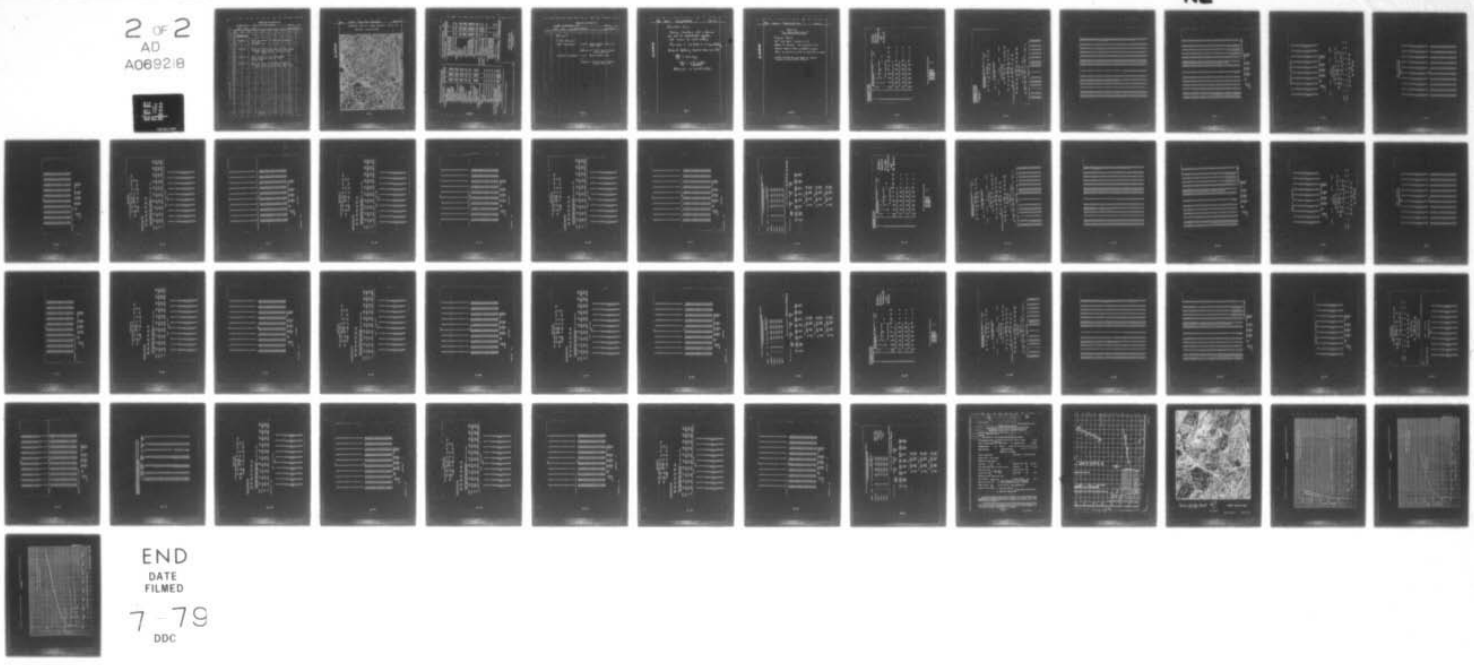

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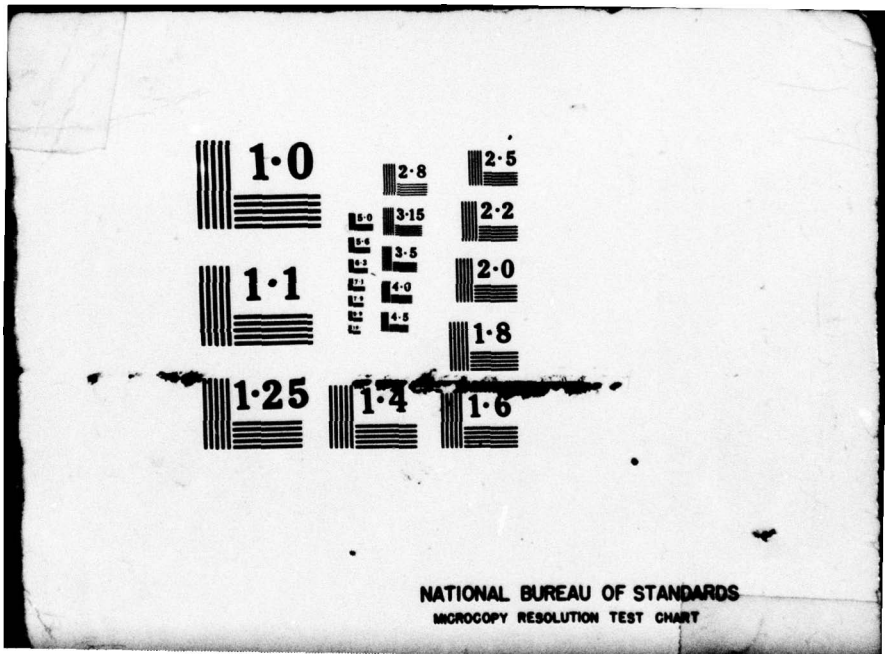
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1·1
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2·8
3·15
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2·2
2·0
1·8
1·6
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

LEEDS, HILL AND JEWETT, INC.

BY RBE DATE CLIENT N.J. Dam Safety SHEET NO. OF

CHKD DATE JOB JOB NO. 302-03

REFERENCES

METHOD 1 - FROM "HANDBOOK OF APPLIED HYDROLOGY" BY CHOW McGRAW HILL pp 21-10, 11

METHOD 2 - FROM CALIFORNIA CULVERTS PRACTICE, CALIF HIGHWAYS AND PUBLIC WORKS, SEPT 1942 SEE USBR DESIGN OF SMALL DAMS PG. 71

METHOD 3 - FROM HYDROLOGY FOR ENGINEERS LINSLEY / KOHLER / PAULUS 1975 PP. 247-248

METHOD 4 - FROM U.S. NAVY - TECHNICAL PUBLICATION NAVDOCKS TP-PW-5 TABLE 8B, MARCH 1953 SEE USBR DESIGN OF SMALL DAMS PG. 70

RBE 790707 GREAT NOTCH RESERVOIR 302-03

LOCATION MAP OF CROSS-SECTIONS USED IN ROUTING CALCULATIONS

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (continued)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

MAIN CHANNEL STATION 3 & 4

FOR STATION 5 n = 0.05 (MAIN CHANNEL)

D-5A

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (continued)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

OVERBANK STATION 3, 4 & 5

VEN TE CHOW, Ph.D.
Professor of Hydraulic Engineering
University of Illinois

LEEDS, HILL AND JEWETT, INC.

BY RBE DATE 790107 CLIENT N.J. SHEET NO. OF

CHKD. DATE JOB GREAT NOTCH JOB NO. 302-07

$Q = CLH^{1.5}$

C FOR SPILLWAY

WITH FLASHBOARDS C=3.3 SHARD CRESTED WEIR AND FROM DATA

↓

REDUCED TO C=2.9 DUE TO FENCE ACROSS SPILLWAY

WITHOUT FLASHBOARDS C=3.1 BROAD CRESTED WEIR

↓

REDUCED TO C=2.6 DUE TO FENCE ACROSS SPILLWAY

Drawdown time:

Average drawdown rate = Average use out of distribution system (No means to waste water)

This rate is 2.5 MGD ≈ 7.7 acre-feet/day

Storage at Spillway Crest ≈ 580 acre-feet

$$\frac{580}{7.7} = 75.3 \text{ days}$$

$$\frac{75.3}{30} = \underline{2.5 \text{ months}}$$

Assumes no runoff inflow

Assumed

Dam Breach Parameters[1]

Triangular Breach

60° side slopes (0.58 h : 1 v)

Breach to elevation 370' (reservoir floor)

Breach begins when overtopping begins

Time to develop maximum breach = 1.0 hrs.

[1] Assumed parameters are based on previous studies of actual dam failures

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  25 SEP 79
     1        A1     NEW JERSEY DAM SAFETY - GREAT NOTCH RESERVOIR DAM  I.D. NO. 00244
     2        A2     HYDRAULIC-HYDROLOGIC ANALYSIS  302-83
     3        A3     PROBABLE MAXIMUM FLOOD                                    -DSS-
     4        Q   300      6      5      0      0      0      0      0      0      6
     5        QI     4
     6        J     1      4      1
     7        J1  0.25    0.5    0.75   1.0
     8        K     0      1                                    1
     9        K1                    INFLOW HYDROGRAPH TO RESERVOIR
    10        Y     1      2     0.3            0.3                        1
    11        P           22.4    113    123    132
    12        T                                                 0.9   0.05
    13        W2          0.2
    14        X    -1    -.05    2.0
    15        K     1      2                                    1
    16        K1                    ROUTED FLOWS THROUGH RESERVOIR
    17        V                                 1      1
    18        VA    1                                                 540
    19        S1    0      23     60     140    335    465    540    580    640    830
    20        SE  370    390    400    410    420    425    427  428.25   430    435
    21        S1  427     46    2.6    1.5
    22        SD  430    3.1    1.5    410
    23        K     1      3                                    1
    24        A1     CHANNEL ROUTING -MODIFIED PULS- STATION 2 TO 3
    25        V                                 1      1
    26        V1    1
    27        V6  0.10   0.05   0.10    300    380    400   0.07
    28        V7    0    190     25    370    125    361    129    360    150    360
    29        V7  150    361    250    370    325    380
    30        K     1      4                                    1
    31        A1     CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4
    32        V                                 1      1
    33        V1    1
    34        V6  .10    .10    .10    300    330   1400   0.043
    35        V7    0    190    190    310    240    303    240    300    269    300
    36        V7  269    303    350    310    490    330
    37        K     1      5                                    1
    38        A1     CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5
    39        V                                 1      1
    40        V1    1
    41        V6  0.10   0.10   0.10    290    310    400   0.025
    42        V7    0    310    300    350    675    291    675    290    700    290
    43        V7  700    291    400    300    850    310
    44        K   99
```

Analysis Assuming No Flashboards and No Breach.

D-9

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

INPUT HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
ROUTE HYDROGRAPH TO	4
ROUTE HYDROGRAPH TO	5
END OF NETWORK	

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  23 SEP 78
**********

RUN  DATE= 11/29/79
     TIME= 09.17.58.
```

NEW JERSEY DAM SAFETY - GREAT NOTCH RESERVOIR DAM I.D. NO. 00244
HYDRAULIC-HYDROLOGIC ANALYSIS 302-03
PROBABLE MAXIMUM FLOOD -SBE-

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	ING	IMIN	METRC	IPLT	IPPT	MSTAN
300	0	5	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1
RTIOS= .25 .50 .75 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO RESERVOIR

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.33	0.00	.30	0.00	0.000	0	1	0

PRECIP DATA

SCSE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.40	113.00	123.00	132.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .400

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	.50	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .20

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

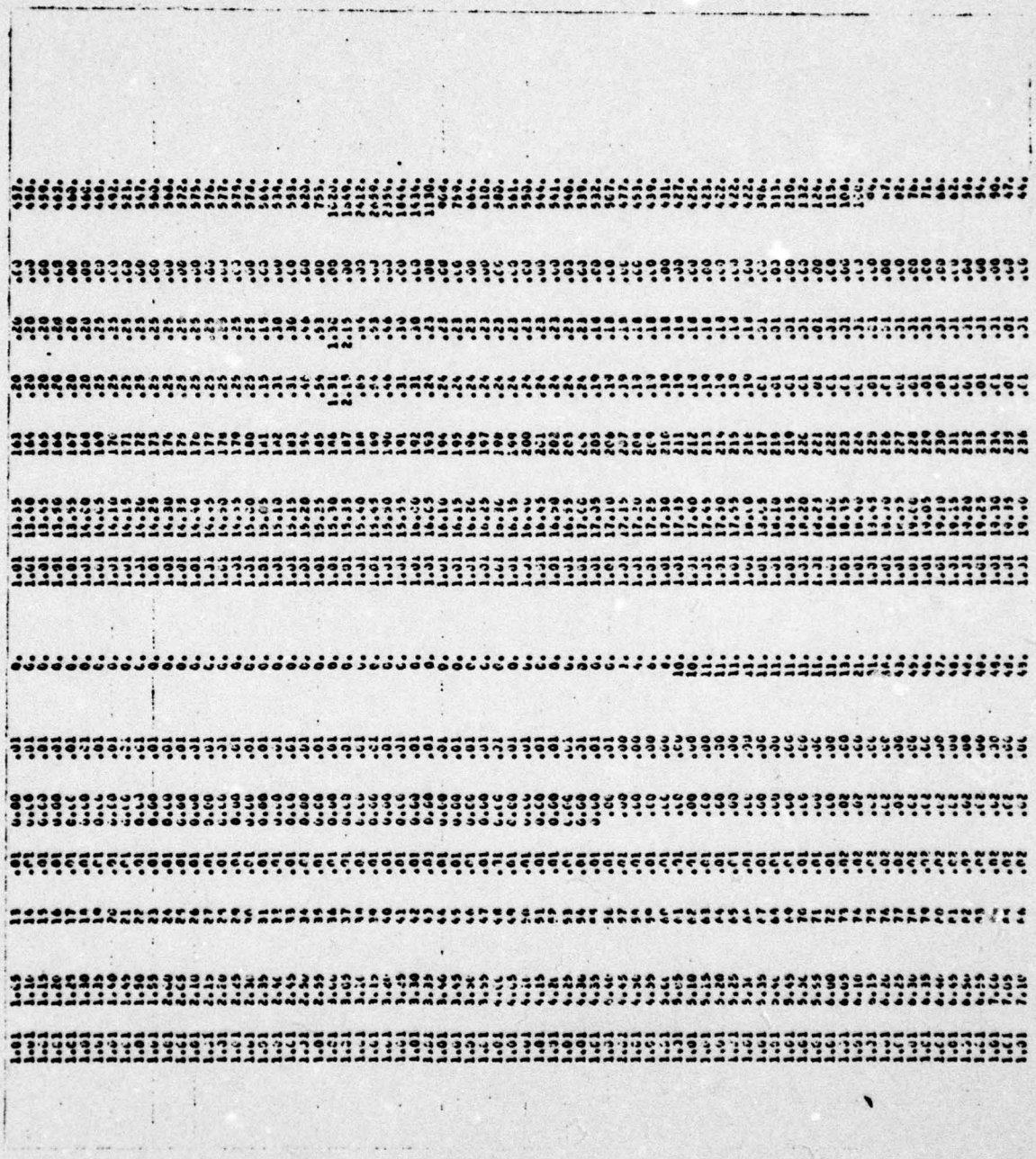
UNIT HYDROGRAPH 14 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .20 VOL= 1.00

146.	482.	598.	478.	266.	153.	87.	50.	28.	16.	9.	6.	3.
1.												

O HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP O
1.01	.05	1	.01	0.00	.01	0.
1.01	.10	2	.01	0.00	.01	0.
1.01	.15	3	.01	0.00	.01	0.
1.01	.20	4	.01	0.00	.01	0.
1.01	.25	5	.01	0.00	.01	0.
1.01	.30	6	.01	0.00	.01	0.
1.01	.35	7	.01	0.00	.01	0.
1.01	.40	8	.01	0.00	.01	0.
1.01	.45	9	.01	0.00	.01	0.
1.01	.50	10	.01	0.00	.01	0.
1.01	.55	11	.01	0.00	.01	0.
1.01	1.00	12	.01	0.00	.01	0.

END-OF-PERIOD FLOW

HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP O
1.01	12.35	151	.17	.16	.00	366.
1.01	12.40	152	.17	.16	.00	371.
1.01	12.45	153	.17	.16	.00	377.
1.01	12.50	154	.17	.16	.00	378.
1.01	12.55	155	.17	.16	.00	391.
1.01	13.00	156	.17	.16	.00	382.
1.01	13.05	157	.20	.20	.00	387.
1.01	13.10	158	.20	.20	.00	403.
1.01	13.15	159	.20	.20	.00	424.
1.01	13.20	160	.20	.20	.00	440.
1.01	13.25	161	.20	.20	.00	449.
1.01	13.30	162	.20	.20	.00	454.



1.61	7.25	87	.02	.02	.06	48.	1.01	19.45	237	.01	.01	.00	41.
1.61	7.26	88	.02	.02	.00	48.	1.01	19.50	238	.01	.01	.00	38.
1.61	7.25	89	.02	.02	.00	48.	1.01	19.55	239	.01	.01	.00	35.
1.01	7.30	90	.02	.02	.00	48.	1.01	20.00	240	.01	.01	.00	33.
1.01	7.35	91	.02	.02	.00	48.	1.01	20.05	241	.01	.01	.00	31.
1.01	7.40	92	.02	.02	.00	48.	1.01	20.10	242	.01	.01	.00	29.
1.01	7.45	93	.02	.02	.00	48.	1.01	20.15	243	.01	.01	.00	27.
1.01	7.50	94	.02	.02	.00	48.	1.01	20.20	244	.01	.01	.00	25.
1.01	7.55	95	.02	.02	.00	48.	1.01	20.25	245	.01	.01	.00	23.
1.01	8.00	96	.02	.02	.00	48.	1.01	20.30	246	.01	.01	.00	22.
1.01	8.05	97	.02	.02	.00	48.	1.01	20.35	247	.01	.01	.00	22.
1.01	8.10	98	.02	.02	.00	48.	1.01	20.40	248	.01	.01	.00	22.
1.01	8.15	99	.02	.02	.00	48.	1.01	20.45	249	.01	.01	.00	22.
1.01	8.20	100	.02	.02	.00	48.	1.01	20.50	250	.01	.01	.00	22.
1.01	8.25	101	.02	.02	.00	48.	1.01	20.55	251	.01	.01	.00	22.
1.01	8.30	102	.02	.02	.00	48.	1.01	21.00	252	.01	.01	.00	22.
1.01	8.35	103	.02	.02	.00	48.	1.01	21.05	253	.01	.01	.00	22.
1.01	8.40	104	.02	.02	.00	48.	1.01	21.10	254	.01	.01	.00	22.
1.01	8.45	105	.02	.02	.00	48.	1.01	21.15	255	.01	.01	.00	22.
1.01	8.50	106	.02	.02	.00	48.	1.01	21.20	256	.01	.01	.00	22.
1.01	8.55	107	.02	.02	.00	48.	1.01	21.25	257	.01	.01	.00	22.
1.01	9.00	108	.02	.02	.00	48.	1.01	21.30	258	.01	.01	.00	22.
1.01	9.05	109	.02	.02	.00	48.	1.01	21.35	259	.01	.01	.00	22.
1.01	9.10	110	.02	.02	.00	48.	1.01	21.40	260	.01	.01	.00	22.
1.01	9.15	111	.02	.02	.00	48.	1.01	21.45	261	.01	.01	.00	22.
1.01	9.20	112	.02	.02	.00	48.	1.01	21.50	262	.01	.01	.00	22.
1.01	9.25	113	.02	.02	.00	48.	1.01	21.55	263	.01	.01	.00	22.
1.01	9.30	114	.02	.02	.00	48.	1.01	22.00	264	.01	.01	.00	22.
1.01	9.35	115	.02	.02	.00	48.	1.01	22.05	265	.01	.01	.00	22.
1.01	9.40	116	.02	.02	.00	48.	1.01	22.10	266	.01	.01	.00	22.
1.01	9.45	117	.02	.02	.00	48.	1.01	22.15	267	.01	.01	.00	22.
1.01	9.50	118	.02	.02	.00	48.	1.01	22.20	268	.01	.01	.00	22.
1.01	9.55	119	.02	.02	.00	48.	1.01	22.25	269	.01	.01	.00	22.
1.01	10.00	120	.02	.02	.00	48.	1.01	22.30	270	.01	.01	.00	22.
1.01	10.05	121	.02	.02	.00	48.	1.01	22.35	271	.01	.01	.00	22.
1.01	10.10	122	.02	.02	.00	48.	1.01	22.40	272	.01	.01	.00	22.
1.01	10.15	123	.02	.02	.00	48.	1.01	22.45	273	.01	.01	.00	22.
1.01	10.20	124	.02	.02	.00	48.	1.01	22.50	274	.01	.01	.00	22.
1.01	10.25	125	.02	.02	.00	48.	1.01	22.55	275	.01	.01	.00	22.
1.01	10.30	126	.02	.02	.00	48.	1.01	23.00	276	.01	.01	.00	22.
1.01	10.35	127	.02	.02	.00	48.	1.01	23.05	277	.01	.01	.00	22.
1.01	10.40	128	.02	.02	.00	48.	1.01	23.10	278	.01	.01	.00	22.
1.01	10.45	129	.02	.02	.00	48.	1.01	23.15	279	.01	.01	.00	22.
1.01	10.50	130	.02	.02	.00	48.	1.01	23.20	280	.01	.01	.00	22.
1.01	10.55	131	.02	.02	.00	48.	1.01	23.25	281	.01	.01	.00	22.
1.01	11.00	132	.02	.02	.00	48.	1.01	23.30	282	.01	.01	.00	22.
1.01	11.05	133	.02	.02	.00	48.	1.01	23.35	283	.01	.01	.00	22.
1.01	11.10	134	.02	.02	.00	48.	1.01	23.40	284	.01	.01	.00	22.
1.01	11.15	135	.02	.02	.00	48.	1.01	23.45	285	.01	.01	.00	22.
1.01	11.20	136	.02	.02	.00	48.	1.01	23.50	286	.01	.01	.00	22.
1.01	11.25	137	.02	.02	.00	48.	1.01	23.55	287	.01	.01	.00	22.
1.01	11.30	138	.02	.02	.00	48.	1.02	0.00	288	.01	.01	.00	22.
1.01	11.35	139	.02	.02	.00	48.	1.02	.05	289	0.00	0.00	0.00	23.
1.01	11.40	140	.02	.02	.00	48.	1.02	.10	290	0.00	0.00	0.00	19.
1.01	11.45	141	.02	.02	.00	48.	1.02	.15	291	0.00	0.00	0.00	18.
1.01	11.50	142	.02	.02	.00	48.	1.02	.20	292	0.00	0.00	0.00	16.
1.01	11.55	143	.02	.02	.00	48.	1.02	.25	293	0.00	0.00	0.00	15.
1.01	12.00	144	.02	.02	.00	48.	1.02	.30	294	0.00	0.00	0.00	14.
1.01	12.05	145	.17	.16	.08	60.	1.02	.35	295	0.00	0.00	0.00	13.
1.01	12.10	146	.17	.16	.06	138.	1.02	.40	296	0.00	0.00	0.00	12.
1.01	12.15	147	.17	.16	.00	224.	1.02	.45	297	0.00	0.00	0.00	12.
1.01	12.20	148	.17	.16	.00	293.	1.02	.50	298	0.00	0.00	0.00	11.
1.01	12.25	149	.17	.16	.00	331.	1.02	.55	299	0.00	0.00	0.00	10.
1.01	12.30	150	.17	.16	.00	353.	1.02	1.00	300	0.00	0.00	0.00	9.
									SUM	23.65	22.10	1.47	52404.
										(601.1)(	561.5)(	37.3)(	1486.29)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2659.	838.	182.	175.	52478.
CMS	75.	18.	5.	5.	1486.
INCHES		19.72	22.60	22.60	22.60
MM		500.91	574.00	574.02	574.02
AC-FT		315.	361.	361.	361.
THOUS CU M		389.	446.	446.	446.

D-12

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	4.	6.	6.
10.	10.	11.	11.	11.	11.	11.	11.	11.	11.
11.	11.	13.	21.	31.	36.	43.	45.	46.	47.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	47.	48.	48.	48.	48.	48.	48.	48.
48.	48.	46.	46.	48.	48.	48.	49.	44.	48.
48.	47.	45.	46.	69.	138.	224.	293.	331.	353.
366.	373.	377.	379.	381.	382.	387.	403.	426.	440.
449.	454.	457.	458.	459.	466.	480.	481.	484.	492.
523.	547.	566.	588.	572.	575.	574.	577.	571.	579.
564.	574.	593.	626.	753.	1120.	1549.	2412.	2659.	2354.
1944.	1434.	1130.	908.	756.	664.	610.	580.	561.	550.
544.	541.	540.	534.	532.	507.	477.	453.	439.	431.
427.	425.	423.	422.	422.	422.	396.	313.	214.	132.
124.	114.	108.	100.	94.	87.	82.	76.	71.	66.
62.	59.	54.	50.	47.	44.	41.	38.	35.	33.
31.	29.	27.	25.	23.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	20.	19.
18.	16.	15.	14.	13.	12.	12.	11.	13.	9.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2659.	636.	182.	175.	52478.
CMS	75.	18.	5.	5.	1486.
INCHES		19.72	22.60	22.60	22.60
MM		500.91	574.00	574.02	574.02
AC-FT		315.	361.	361.	361.
THOUS CU M		389.	446.	446.	446.

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH RESERVOIR

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

MSTPS	MSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.030	0.000	0.000	940.	0

CAPACITY=	0.	23.	60.	140.	335.	469.	540.	580.	640.	830.
ELEVATION=	370.	390.	400.	410.	420.	425.	427.	428.	430.	435.

CAPL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
427.0	90.6	2.6	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
430.0	3.1	1.5	410.

```
                              STATION      2, PLAN 1, RATIO 4

                            END-OF-PERIOD HYDROGRAPH ORDINATES

                                          OUTFLOW
      0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0.        0.        0.        1.
      1.        1.        1.        1.        1.        1.        2.        2.        3.        3.
      4.        4.        5.        6.        6.        7.        8.        8.        9.       10.
     10.       11.       12.       12.       13.       14.       14.       15.       16.       16.
     17.       18.       18.       19.       20.       20.       21.       21.       22.       23.
     23.       24.       24.       25.       26.       26.       27.       27.       28.       28.
     29.       30.       30.       30.       31.       31.       31.       32.       32.       33.
     33.       34.       34.       34.       35.       35.       35.       36.       36.       36.
     37.       37.       37.       38.       38.       40.       44.       50.       54.       68.
     76.       88.       98.      109.      120.      130.      141.      152.      163.      175.
    187.      199.      210.      221.      232.      243.      253.      263.      273.      283.
    294.      306.      319.      332.      344.      356.      368.      379.      390.      401.
    410.      418.      425.      434.      446.      474.      525.      619.      824.     1218.
   1449.     1563.     1440.     1324.     1195.     1075.      974.      853.      833.      781.
    743.      714.      692.      677.      660.      659.      648.      636.      624.      612.
    601.      590.      580.      570.      561.      553.      544.      533.      516.      496.
    474.      454.      434.      415.      398.      381.      365.      349.      335.      321.
    308.      295.      283.      272.      261.      251.      241.      232.      223.      214.
    206.      198.      191.      183.      176.      169.      163.      157.      151.      145.
    140.      135.      130.      126.      122.      118.      114.      110.      107.      104.
    101.       98.       95.       92.       89.       87.       85.       82.       80.       78.
     76.       74.       73.       71.       69.       68.       66.       65.       63.       62.
     61.       59.       58.       57.       56.       55.       54.       53.       52.       51.
     50.       49.       48.       47.       46.       45.       44.       43.       42.       41.

                                          STORAGE
    540.      540.      540.      540.      540.      540.      540.      540.      540.      540.
    540.      540.      540.      540.      540.      540.      540.      540.      540.      540.
    540.      540.      540.      540.      540.      540.      540.      540.      540.      540.
    540.      540.      540.      540.      540.      540.      540.      540.      540.      540.
    540.      540.      540.      540.      540.      540.      540.      540.      540.      540.
    540.      540.      540.      540.      540.      540.      540.      540.      540.      540.
    540.      540.      540.      540.      540.      541.      541.      541.      541.      541.
    541.      541.      541.      541.      541.      542.      542.      542.      542.      543.
    543.      543.      544.      544.      544.      545.      545.      545.      545.      546.
    546.      546.      546.      547.      547.      547.      547.      548.      548.      548.
    548.      548.      549.      549.      549.      549.      549.      550.      550.      550.
    550.      550.      551.      551.      551.      551.      551.      551.      551.      552.
    552.      552.      552.      552.      552.      552.      552.      553.      553.      553.
    553.      553.      553.      553.      553.      553.      553.      554.      554.      554.
    554.      554.      554.      554.      554.      555.      556.      557.      559.      561.
    563.      565.      567.      568.      570.      572.      574.      575.      577.      579.
    581.      583.      584.      586.      588.      589.      591.      592.      593.      595.
    598.      599.      600.      601.      603.      604.      606.      607.      608.      610.
    611.      612.      613.      614.      615.      618.      624.      634.      647.      657.
    662.      663.      662.      660.      657.      654.      651.      649.      647.      645.
    644.      642.      641.      640.      639.      638.      637.      636.      635.      633.
    632.      631.      630.      629.      628.      627.      626.      625.      623.      621.
    618.      616.      614.      612.      609.      607.      605.      603.      602.      600.
    598.      597.      595.      593.      592.      590.      589.      588.      586.      585.
    584.      583.      581.      580.      579.      578.      577.      576.      575.      574.
    574.      573.      572.      571.      571.      570.      569.      569.      568.      568.
    567.      566.      566.      565.      565.      564.      564.      564.      563.      563.
    562.      562.      562.      561.      561.      561.      560.      560.      560.      560.
    559.      559.      559.      559.      559.      559.      559.      558.      557.      557.
    557.      557.      556.      556.      556.      556.      555.      555.      555.      555.
```

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                                                    STAGE
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0     427.0
         427.0     427.0     427.0     427.0     427.0     427.0     427.1     427.1     427.1     427.1
         427.1     427.1     427.1     427.1     427.1     427.1     427.1     427.2     427.2     427.2
         427.2     427.2     427.2     427.2     427.2     427.2     427.2     427.2     427.2     427.3
         427.3     427.3     427.3     427.3     427.3     427.3     427.3     427.3     427.3     427.3
         427.3     427.3     427.3     427.3     427.3     427.3     427.3     427.4     427.4     427.4
         427.4     427.4     427.4     427.4     427.4     427.4     427.4     427.4     427.4     427.4
         427.4     427.4     427.4     427.4     427.4     427.4     427.4     427.4     427.4     427.4
         427.4     427.4     427.4     427.4     427.4     427.5     427.5     427.5     427.6     427.6
         427.7     427.9     427.9     427.9     427.9     428.0     428.1     428.1     428.2     428.2
         428.3     428.3     428.4     428.4     428.5     428.5     428.6     428.6     428.6     428.7
         428.7     428.9     428.8     428.9     428.9     429.0     429.0     429.0     429.1     429.1
         429.2     429.2     429.2     429.2     429.3     429.4     429.5     429.8     430.2     430.4
         430.6     430.6     430.6     430.5     430.4     430.4     430.3     430.2     430.2     430.1
         430.1     430.1     430.0     430.0     430.0     429.9     429.9     429.9     429.8     429.8
         429.6     429.7     429.7     429.7     429.7     429.5     429.6     429.5     429.5     429.4
         429.4     429.3     429.2     429.2     429.1     429.0     429.0     428.9     428.9     428.8
         428.8     428.7     428.7     428.6     428.6     428.5     428.5     428.5     428.4     428.4
         428.4     428.3     428.3     428.3     428.2     428.2     428.2     428.1     428.1     428.1
         428.2     428.0     428.0     428.0     428.0     427.9     427.9     427.9     427.9     427.9
         427.8     427.8     427.8     427.8     427.8     427.8     427.8     427.7     427.7     427.7
         427.7     427.7     427.7     427.7     427.7     427.6     427.6     427.6     427.6     427.6
         427.6     427.6     427.6     427.6     427.6     427.6     427.6     427.5     427.5     427.5
         427.5     427.5     427.5     427.5     427.5     427.5     427.5     427.5     427.5     427.5

PEAK OUTFLOW IS      1503. AT TIME  16.00 HOURS

                           PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                 CFS      1503.      557.      175.       160.        50371.
                 CMS        43.       16.        5.         5.         1426.
              INCHES                17.27     21.69      21.69         21.69
                  MM               438.74    551.00     551.00        551.00
               AC-FT                 270.      347.       347.          347.
          THOUS CU M                 341.      428.       428.          428.
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D-15

HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 2 TO 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	C	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPAP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
01000300		0	0.000	0.000	0.000	C.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVF	ELMAX	ELMIN	SEL
.1600	.0500	.1000	366.0	383.0	400.	.07000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	380.00	25.00	370.00	125.00	361.00	125.00	360.00	150.00	360.00	
196.00	361.00	250.00	370.00	325.00	380.00					
STORAGE	0.00	.24	.61	1.20	2.02	3.06	4.33	5.83	7.55	9.50
	11.64	13.94	16.32	18.84	21.34	24.06	26.85	29.73	32.72	35.81
OUTFLOW	0.00	203.97	601.48	1484.76	2673.13	4296.94	6409.38	9059.15	12202.86	16155.37
	20647.85	26482.90	32733.55	39630.96	47186.93	55403.10	64285.50	73841.15	84077.08	95004.00
STAGE	360.00	361.05	362.11	363.16	364.21	365.26	366.32	367.37	368.42	369.47
	370.53	371.58	372.63	373.68	374.74	375.79	376.84	377.89	378.95	380.00
FLOW	0.00	203.97	601.48	1484.76	2673.13	4296.94	6409.38	9059.15	12202.86	16155.37
	20647.85	26482.90	32733.55	39630.96	47186.93	55403.10	64285.50	73841.15	84077.08	95004.00

STATION 3, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	2.	2.	3.	3.
4.	4.	5.	6.	7.	7.	8.	9.	9.	9.
10.	11.	11.	12.	13.	14.	14.	15.	16.	16.
17.	18.	18.	19.	19.	20.	21.	21.	22.	23.
23.	24.	24.	25.	25.	26.	27.	27.	28.	28.
29.	29.	30.	30.	31.	31.	31.	32.	32.	33.
33.	33.	34.	34.	35.	35.	35.	36.	36.	36.
37.	37.	37.	38.	38.	40.	43.	49.	57.	66.
75.	84.	97.	107.	118.	129.	139.	151.	161.	173.
185.	197.	208.	220.	231.	242.	252.	262.	272.	282.
293.	305.	314.	330.	343.	355.	367.	378.	389.	399.
409.	417.	426.	433.	447.	471.	510.	606.	703.	1160.
1437.	1561.	1452.	1330.	1206.	1087.	985.	911.	835.	785.
746.	716.	696.	678.	668.	660.	649.	638.	625.	614.
602.	591.	581.	571.	562.	554.	545.	534.	516.	498.
478.	448.	436.	417.	400.	383.	367.	351.	337.	323.
309.	297.	285.	273.	262.	252.	242.	233.	224.	215.
207.	199.	192.	185.	178.	171.	164.	158.	152.	146.
141.	136.	131.	127.	123.	119.	115.	111.	108.	104.
101.	98.	95.	93.	91.	87.	85.	83.	81.	79.
77.	75.	73.	71.	70.	68.	66.	65.	63.	62.
61.	60.	58.	57.	56.	55.	54.	53.	52.	51.
50.	49.	48.	47.	46.	45.	44.	43.	42.	41.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1
360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1
360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1
360.1	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2
360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2
360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.3	360.3	360.3
360.4	360.4	360.5	360.6	360.6	360.7	360.7	360.9	360.8	360.9
361.0	361.0	361.1	361.1	361.1	361.1	361.2	361.2	361.2	361.2
361.2	361.3	361.3	361.5	361.5	361.4	361.4	361.4	361.5	361.5
361.5	361.5	361.5	361.6	361.8	361.6	361.7	361.9	362.1	362.7
363.1	363.2	363.1	363.0	362.8	362.6	362.5	362.4	362.3	362.2
362.2	362.1	362.1	362.1	362.1	362.1	362.0	362.0	362.0	362.0
361.9	361.9	361.9	361.9	361.8	361.4	361.6	361.9	361.7	361.7
361.7	361.6	361.6	361.5	361.5	361.4	361.4	361.4	361.3	361.3
361.5	361.3	361.2	361.2	361.2	361.2	361.1	361.1	361.1	361.1
361.1	361.0	361.0	361.0	360.9	360.9	360.8	360.8	360.8	360.8
360.7	360.7	360.7	360.7	360.6	360.6	360.6	360.6	360.6	360.5
360.5	360.5	360.5	360.5	360.5	360.5	360.4	360.4	360.4	360.4
360.4	360.4	360.4	360.4	360.4	360.4	360.3	360.3	360.3	360.3
360.3	360.3	360.3	360.3	360.3	360.3	360.3	360.3	360.3	360.3
360.3	360.3	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1533.	597.	179.	160.	50364.
CMS	43.	16.	5.	5.	1426.
INCHES		17.27	21.69	21.69	21.69
MM		438.74	550.92	550.92	550.92
AC-FT		276.	347.	347.	347.
THOUS CU M		341.	428.	428.	428.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 363.2

HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	01C000000	0	0.000	0.000	0.600	0.	0

NORMAL DEPTH CHANNEL ROUTING

SK(1)	SK(2)	SK(3)	ELMXF	ELMAX	ELMIN	SEL
.100C	.1030	.1030	306.0	336.0	1466.	.064C0

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 530.00 150.00 310.00 240.00 303.00 240.00 300.00 265.00 300.00
265.00 303.00 350.00 310.00 450.00 330.00

STORAGE	0.00	1.27	4.95	9.62	9.49	15.97	24.45	34.71	46.03	58.35
	71.67	85.99	101.31	117.44	134.97	153.30	172.63	192.96	214.29	236.63
OUTFLOW	0.00	192.77	492.07	999.94	2037.74	3771.66	6372.84	10190.01	15129.97	21103.67
	28141.65	36241.52	45562.88	56027.96	67718.35	80676.37	94944.36	110564.52	127578.76	146028.68
STAGE	300.03	311.44	309.16	306.74	306.32	307.89	309.47	311.05	312.63	314.21
	315.79	317.37	314.95	320.53	322.11	323.68	325.26	326.84	328.42	330.00
FLOW	0.00	192.77	492.07	999.94	2037.74	3771.66	6372.84	10190.01	15129.97	21103.67
	28141.65	36241.52	45562.88	56027.96	67718.35	80676.37	94944.36	110564.52	127578.76	146028.68

STATION 4, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	2.	2.	3.
3.	4.	4.	5.	5.	6.	7.	7.	8.	9.
9.	10.	11.	11.	12.	13.	13.	14.	15.	15.
16.	17.	17.	18.	19.	19.	20.	21.	21.	22.
22.	23.	24.	24.	25.	25.	26.	26.	27.	27.
28.	28.	29.	29.	30.	30.	31.	31.	32.	32.
33.	33.	33.	34.	34.	35.	35.	35.	36.	36.
36.	37.	37.	37.	38.	38.	40.	44.	49.	56.
65.	74.	84.	95.	105.	116.	126.	137.	148.	162.
177.	189.	201.	213.	224.	235.	246.	256.	266.	276.
286.	296.	310.	322.	335.	348.	360.	371.	382.	393.
403.	413.	426.	428.	436.	457.	484.	552.	692.	930.
1257.	1644.	1673.	1633.	1297.	1184.	1053.	919.	841.	820.
773.	737.	711.	699.	676.	664.	630.	645.	633.	621.
610.	598.	944.	576.	564.	550.	531.	541.	529.	511.
491.	469.	449.	429.	411.	391.	378.	361.	345.	331.
319.	305.	292.	281.	269.	259.	249.	239.	229.	220.
212.	204.	196.	189.	182.	175.	168.	162.	155.	151.
147.	142.	137.	132.	128.	124.	119.	116.	112.	108.
105.	102.	99.	96.	93.	91.	88.	86.	83.	81.
79.	77.	75.	73.	72.	70.	69.	67.	65.	64.
62.	61.	60.	59.	57.	56.	55.	54.	53.	52.
51.	50.	49.	48.	47.	46.	45.	44.	43.	43.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	3.	3.	3.	4.	5.
4.	7.	7.	7.	6.	4.	5.	5.	4.	4.
4.	4.	4.	4.	4.	4.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.1	300.1	300.1	300.1	300.1	300.1
300.1	300.1	300.1	300.1	300.1	300.1	300.1	300.1	300.2	300.2
300.2	300.2	300.2	300.2	300.2	300.2	300.2	300.2	300.2	300.2
300.2	300.2	300.2	300.3	300.3	300.3	300.3	300.3	300.3	300.3
300.3	300.3	300.3	300.3	300.3	300.3	300.3	300.3	300.3	300.3
300.3	300.3	300.3	300.3	300.4	300.4	300.4	300.4	300.4	300.4
300.4	300.4	300.4	300.4	300.4	300.4	300.4	300.5	300.5	300.6
300.7	300.8	300.9	301.0	301.1	301.2	301.3	301.4	301.5	301.6
301.7	301.9	301.8	301.9	302.0	302.0	302.1	302.1	302.2	302.2
302.3	302.3	302.4	302.5	302.5	302.6	302.7	302.7	302.8	302.9
302.9	302.9	303.0	303.0	303.1	303.2	303.3	303.4	303.8	304.6
305.1	305.4	305.5	305.4	305.2	305.0	304.8	304.6	304.4	304.2
304.1	304.0	303.9	303.8	303.8	303.4	303.7	303.7	303.7	303.6
303.6	303.6	303.5	303.5	303.5	303.5	303.4	303.4	303.4	303.3
303.3	303.2	303.1	303.0	302.9	302.8	302.7	302.7	302.6	302.5
302.4	302.4	302.3	302.2	302.2	302.1	302.1	302.0	302.0	301.9
301.9	301.8	301.8	301.8	301.7	301.7	301.7	301.6	301.6	301.6
301.5	301.5	301.4	301.4	301.3	301.3	301.2	301.2	301.2	301.1
301.1	301.1	301.0	301.0	301.0	300.9	300.9	300.9	300.9	300.8
300.8	300.8	300.8	300.8	300.7	300.7	300.7	300.7	300.7	300.7
300.6	300.6	300.6	300.6	300.6	300.6	300.6	300.6	300.5	300.5
300.5	300.5	300.5	300.5	300.5	300.5	300.5	300.5	300.4	300.4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1473.	557.	175.	180.	50313.
CMS	42.	16.	5.	5.	1425.
INCHES		17.27	21.67	21.67	21.67
MM		438.72	550.36	550.36	550.36
AC-FT		276.	347.	347.	347.
THOUS CU M		341.	427.	427.	427.

MAXIMUM STORAGE = 7.

MAXIMUM STAGE IS 305.9

HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
4	6	0	0.000	0.046	0.040	0.	0

NORMAL DEPTH CHANNEL ROUTING

QK(1)	QK(2)	QK(3)	FLAVI	ELMAX	ELMIN	SEL
.1000	.1000	.1000	290.0	310.0	400.	.02500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	310.00	300.00	300.00	675.00	291.00	675.00	290.00	700.00	290.00	
700.00	291.00	803.30	300.00	850.00	310.00					

STORAGE	0.00	.24	.74	1.45	3.46	5.61	8.38	11.52	15.28	19.57
	24.34	29.57	35.12	41.02	47.26	53.89	60.86	68.19	75.87	83.91
OUTFLOW	0.00	60.94	244.00	604.63	1492.20	2761.12	4575.85	7014.48	10150.38	14053.15
	18962.81	24847.43	31670.80	39339.44	47921.84	57447.16	67944.84	79444.90	91979.73	105568.62
STAGE	290.00	291.04	292.11	293.16	294.21	295.26	296.32	297.37	298.42	299.47
	300.53	301.58	302.63	303.68	304.74	305.79	306.84	307.89	308.95	310.00
FLOW	0.00	60.94	244.00	604.63	1492.20	2761.12	4575.85	7014.48	10150.38	14053.15
	18962.81	24847.43	31670.80	39339.44	47921.84	57447.16	67944.84	79444.90	91979.73	105568.62

STATION 5, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	2.	2.	2.
3.	3.	4.	4.	5.	6.	6.	7.	8.	8.
9.	10.	10.	11.	12.	12.	13.	14.	14.	15.
16.	16.	17.	18.	18.	19.	20.	20.	21.	22.
22.	23.	23.	24.	24.	25.	26.	26.	27.	27.
28.	29.	29.	29.	30.	30.	31.	31.	31.	32.
32.	33.	33.	34.	34.	34.	35.	35.	35.	36.
36.	36.	37.	37.	37.	38.	39.	42.	45.	52.
64.	79.	84.	90.	101.	111.	122.	132.	144.	156.
171.	184.	198.	204.	216.	230.	241.	252.	262.	272.
282.	294.	306.	318.	331.	343.	355.	367.	374.	369.
406.	409.	417.	425.	437.	454.	477.	520.	632.	693.
1153.	1601.	1475.	1428.	1323.	1149.	1042.	982.	911.	837.
748.	767.	717.	669.	606.	669.	650.	649.	633.	624.
614.	609.	592.	581.	572.	562.	554.	545.	531.	517.
498.	477.	458.	438.	417.	399.	382.	366.	351.	336.
322.	309.	297.	285.	273.	262.	252.	242.	231.	224.
215.	207.	200.	192.	185.	178.	171.	164.	158.	153.
149.	144.	139.	134.	130.	125.	121.	117.	113.	110.
106.	103.	100.	97.	94.	92.	89.	87.	84.	82.
80.	78.	76.	74.	72.	71.	69.	67.	66.	64.
63.	62.	60.	59.	58.	57.	56.	55.	54.	53.
52.	51.	50.	49.	48.	47.	46.	45.	44.	43.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
3.	3.	3.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.1	290.1	290.1	290.1	290.1	290.1	290.1	290.1	290.1	290.1
290.2	290.2	290.2	290.2	290.2	290.2	290.2	290.2	290.2	290.3
290.3	290.3	290.3	290.3	290.3	290.3	290.3	290.3	290.4	290.4
290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.5	290.5	290.5
290.5	290.5	290.5	290.5	290.5	290.5	290.5	290.5	290.5	290.6
290.6	290.6	290.6	290.6	290.6	290.6	290.6	290.6	290.6	290.6
290.6	290.6	290.8	290.6	290.6	290.7	290.7	290.7	290.8	290.9
291.0	291.1	291.2	291.2	291.3	291.3	291.4	291.5	291.5	291.6
291.7	291.8	291.9	291.9	292.0	292.0	292.1	292.1	292.1	292.2
292.2	292.2	292.3	292.3	292.3	292.3	292.4	292.4	292.4	292.5
292.5	292.5	292.5	292.5	292.6	292.6	292.7	292.8	293.0	293.4
293.8	294.1	294.2	294.1	294.0	293.8	293.7	293.5	293.4	293.4
293.3	293.2	293.2	293.2	293.1	293.1	293.1	293.1	293.0	293.0
293.0	293.0	292.9	292.9	292.9	292.9	292.8	292.8	292.8	292.8
292.7	292.7	292.6	292.6	292.5	292.5	292.4	292.4	292.4	292.3
292.3	292.3	292.2	292.2	292.2	292.1	292.1	292.1	292.0	292.0
291.9	291.9	291.8	291.8	291.8	291.7	291.7	291.6	291.6	291.6
291.6	291.5	291.5	291.5	291.4	291.4	291.4	291.4	291.4	291.3
291.3	291.3	291.3	291.3	291.2	291.2	291.2	291.2	291.2	291.2
291.2	291.1	291.1	291.1	291.1	291.1	291.1	291.1	291.1	291.1
291.1	291.1	291.0	291.0	291.0	291.0	291.0	290.9	290.9	290.9
290.9	290.9	290.9	290.8	290.8	290.8	290.8	290.8	290.8	290.7

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1479.	557.	175.	160.	50284.
CMS	42.	16.	5.	5.	1424.
INCHES		17.27	21.66	21.66	21.66
MM		438.68	550.09	550.09	550.09
AC-FT		276.	346.	346.	346.
THOUS CU M		341.	427.	427.	427.

MAXIMUM STORAGE = 3.

MAXIMUM STAGE IS 294.2

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 .25	RATIO 2 .50	RATIO 3 .75	RATIO 4 1.00
HYDROGRAPH AT	1	.30	1	665.	1329.	1994.	2659.
	(	.781	(	18.823(	37.646(	56.469(	75.291(
ROUTED TO	2	.30	1	195.	446.	771.	1501.
	(	.781	(	5.511(	12.643(	21.833(	42.519(
ROUTED TO	3	.30	1	195.	446.	771.	1501.
	(	.781	(	5.511(	12.633(	21.833(	42.523(
ROUTED TO	4	.30	1	194.	445.	766.	1473.
	(	.781	(	5.501(	12.611(	21.703(	41.723(
ROUTED TO	5	.30	1	194.	445.	765.	1475.
	(	.781	(	5.5C1(	12.591(	21.653(	41.771(

SUMMARY OF DAM SAFETY ANALYSIS — No Flashboards, No Breach.

PLAN 1 ***********

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	427.00	427.00	430.00
STORAGE	940.	940.	660.
OUTFLOW	0.	0.	679.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.25	428.31	0.00	582.	195.	0.00	16.25	0.00
.50	429.28	0.00	815.	446.	0.00	16.17	0.00
.75	430.12	.12	869.	771.	.50	16.08	0.00
1.00	430.61	.61	883.	1513.	1.33	16.00	0.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	195.	381.0	16.25
.50	446.	381.4	16.17
.75	771.	382.2	16.17
1.00	1501.	383.2	16.00

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	194.	381.9	16.33
.50	445.	383.1	16.25
.75	766.	384.1	16.17
1.00	1473.	385.5	16.08

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	194.	291.0	16.33
.50	445.	292.6	16.25
.75	765.	293.8	16.25
1.00	1475.	294.2	16.08

```
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  25 SEP 78
0000000000000000000000000000000

    1              A1    NEW JERSEY DAM SAFETY - GREAT NOTCH RESERVOIR DAM  I.D. NO. 60244
    2              A2    HYDRAULIC-HYDROLOGIC ANALYSIS   302-03
    3              A3    APPROACH CAPIMUM FLOOD                                    -DSS-
    4              B   300       0       9       0       0       0       0       0       0       0
    5              B1    9
    6              J     1       4       1
    7              J1  0.25     0.5    0.75     1.0
    8              K     0       1                                       1
    9              K1                          INFLOW HYDROGRAPH TO RESERVOIR
   10              M     1       2      3.3             6.3                                     1
   11              P            22.4     113     128     132
   12              T                                                    0.9    0.05
   13              M2            0.2
   14              K    -1     -.05     2.0
   15              K     1       2                                       1
   16              K1                          ROUTED FLOWS THROUGH RESERVOIR
   17              V                                   1       1
   18              V1    1                                                   500
   19              S5    0      73      88     140     335     465     540     500     640     830
   20              SE  370     390     400     410     423     425     427  426.25     430     435
   21              S6  426.25    50     2.9     1.5
   22              S3  430     3.1     1.5     410
   23              K     1       3                                       1
   24              K1          CHANNEL ROUTING -MODIFIED PULS- STATION 2 TO 3
   25              V                                   1       1
   26              V1    1
   27              V4  0.10    0.05    0.10     300     300     400    0.007
   28              V7    0     340      25     370     325     341     125     300     150     300
   29              V7  150     341     250     370     325     300                             1
   30              K     1       4
   31              K1          CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4
   32              V                                   1       1
   33              V1    1
   34              V4  .35     .16     .20     300     330    1400    0.043
   35              V7    0     340     150     310     240     303     240     300     265     300
   36              V7  269     303     350     310     430     330                             1
   37              K     1       5
   38              K1          CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5
   39              V                                   1       1
   40              V1    1
   41              V4  0.10    0.10    0.10     290     310     400    0.025
   42              V7    0     310     300     303     675     291     675     290     760     290
   43              V7  700     291     600     300     850     310
   44              K    99
```

Analysis Assuming 15-inches of Flashboards and No Breach.

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

```
RUNOFF HYDROGRAPH AT          1
ROUTE HYDROGRAPH TO           2
ROUTE HYDROGRAPH TO           3
ROUTE HYDROGRAPH TO           4
ROUTE HYDROGRAPH TO           5
END OF NETWORK
```

D-23

NEW JERSEY DAM SAFETY - GREAT NOTCH RESERVOIR DAM I.D. NO. NJ0244
HYDROMETEOROLOGIC ANALYSIS 302-83
PROGRAM MAXIMUM FLOW -ABE-

JOB SPECIFICATION

NO	NMO	MMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	5	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1
RTIOS= .25 .50 .75 1.00

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	HUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.30	0.00	.30	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.40	123.00	123.00	132.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .000

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	2.00	.50	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .20

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 14 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .20 VOL= 1.00

146.	482.	598.	478.	266.	153.	87.	50.	28.	16.	
9.	6.	3.	1.							

END-OF-PERIOD FLOW

NO.HR	NO.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.HR	NO.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	0.	1.01	12.35	151	.17	.16	.00	366.
1.01	.10	2	.01	0.00	.01	0.	1.01	12.40	152	.17	.16	.00	373.
1.01	.15	3	.01	0.00	.01	0.	1.01	12.45	153	.17	.16	.00	377.
1.01	.20	4	.01	0.00	.01	0.	1.01	12.50	154	.17	.16	.00	379.
1.01	.25	5	.01	0.00	.01	0.	1.01	12.55	155	.17	.16	.00	381.
1.01	.30	6	.01	0.00	.01	0.	1.01	13.00	156	.17	.16	.00	382.
1.01	.35	7	.01	0.00	.01	0.	1.01	13.05	157	.20	.20	.00	387.
1.01	.40	8	.01	0.00	.01	0.	1.01	13.10	158	.20	.20	.00	403.
1.01	.45	9	.01	0.00	.01	0.	1.01	13.15	159	.20	.20	.00	424.
1.01	.50	10	.01	0.00	.01	0.	1.01	13.20	160	.20	.20	.00	440.
1.01	.55	11	.01	0.00	.01	0.	1.01	13.25	161	.20	.20	.00	449.
1.01	1.00	12	.01	0.00	.01	0.	1.01	13.30	162	.20	.20	.00	454.
1.01	1.05	13	.01	0.00	.01	0.	1.01	13.35	163	.20	.20	.00	457.
1.01	1.10	14	.01	0.00	.01	0.	1.01	13.40	164	.20	.20	.00	458.
1.01	1.15	15	.01	0.00	.01	0.	1.01	13.45	165	.20	.20	.00	459.
1.01	1.20	16	.01	0.00	.01	0.	1.01	13.50	166	.20	.20	.00	460.
1.01	1.25	17	.01	0.00	.01	0.	1.01	13.55	167	.20	.20	.00	460.
1.01	1.30	18	.01	0.00	.01	0.	1.01	14.00	168	.20	.20	.00	460.
1.01	1.35	19	.01	0.00	.01	0.	1.01	14.05	169	.25	.25	.00	480.
1.01	1.40	20	.01	0.00	.01	0.	1.01	14.10	170	.25	.25	.00	492.
1.01	1.45	21	.01	0.00	.01	0.	1.01	14.15	171	.25	.25	.00	523.
1.01	1.50	22	.01	0.00	.01	0.	1.01	14.20	172	.25	.25	.00	547.
1.01	1.55	23	.01	0.00	.01	0.	1.01	14.25	173	.25	.25	.00	566.
1.01	2.00	24	.01	0.00	.01	0.	1.01	14.30	174	.25	.25	.00	564.
1.01	2.05	25	.01	0.00	.01	0.	1.01	14.35	175	.25	.25	.00	572.

1.31	7.85	91	.02	.02	.00	48.	1.01	20.05	241	.01	.01	.00	31.
1.31	7.90	92	.02	.02	.00	48.	1.01	20.10	242	.01	.01	.00	29.
1.01	7.95	93	.02	.02	.00	48.	1.01	20.15	243	.01	.01	.00	27.
1.01	7.91	94	.02	.02	.00	48.	1.01	20.20	244	.01	.01	.00	25.
1.01	7.95	95	.02	.02	.00	48.	1.01	20.25	245	.01	.01	.00	23.
1.01	8.00	96	.02	.02	.00	48.	1.01	20.30	246	.01	.01	.00	22.
1.01	8.05	97	.02	.02	.00	48.	1.01	20.35	247	.01	.01	.00	22.
1.01	8.10	98	.02	.02	.00	48.	1.01	20.40	248	.01	.01	.00	22.
1.01	8.15	99	.02	.02	.00	48.	1.01	20.45	249	.01	.01	.00	22.
1.01	8.20	100	.02	.02	.00	48.	1.01	20.50	250	.01	.01	.00	22.
1.01	8.25	101	.02	.02	.00	48.	1.01	20.55	251	.01	.01	.00	22.
1.01	8.30	102	.02	.02	.00	48.	1.01	21.00	252	.01	.01	.00	22.
1.01	8.35	103	.02	.02	.00	48.	1.01	21.05	253	.01	.01	.00	22.
1.01	8.40	104	.02	.02	.00	48.	1.01	21.10	254	.01	.01	.00	22.
1.01	8.45	105	.02	.02	.00	48.	1.01	21.15	255	.01	.01	.00	22.
1.01	8.50	106	.02	.02	.00	48.	1.01	21.20	256	.01	.01	.00	22.
1.01	8.55	107	.02	.02	.00	48.	1.01	21.25	257	.01	.01	.00	22.
1.01	9.00	108	.02	.02	.00	48.	1.01	21.30	258	.01	.01	.00	22.
1.01	9.05	109	.02	.02	.00	48.	1.01	21.35	259	.01	.01	.00	22.
1.01	9.10	110	.02	.02	.00	48.	1.01	21.40	260	.01	.01	.00	22.
1.01	9.15	111	.02	.02	.00	48.	1.01	21.45	261	.01	.01	.00	22.
1.01	9.20	112	.02	.02	.00	48.	1.01	21.50	262	.01	.01	.00	22.
1.01	9.25	113	.02	.02	.00	48.	1.01	21.55	263	.01	.01	.00	22.
1.01	9.30	114	.02	.02	.00	48.	1.01	22.00	264	.01	.01	.00	22.
1.01	9.35	115	.02	.02	.00	48.	1.01	22.05	265	.01	.01	.00	22.
1.01	9.40	116	.02	.02	.00	48.	1.01	22.10	266	.01	.01	.00	22.
1.01	9.45	117	.02	.02	.00	48.	1.01	22.15	267	.01	.01	.00	22.
1.01	9.50	118	.02	.02	.00	48.	1.01	22.20	268	.01	.01	.00	22.
1.01	9.55	119	.02	.02	.00	48.	1.01	22.25	269	.01	.01	.00	22.
1.01	10.00	120	.02	.02	.00	48.	1.01	22.30	270	.01	.01	.00	22.
1.01	10.05	121	.02	.02	.00	48.	1.01	22.35	271	.01	.01	.00	22.
1.01	10.10	122	.02	.02	.00	48.	1.01	22.40	272	.01	.01	.00	22.
1.01	10.15	123	.02	.02	.00	48.	1.01	22.45	273	.01	.01	.00	22.
1.01	10.20	124	.02	.02	.00	48.	1.01	22.50	274	.01	.01	.00	22.
1.01	10.25	125	.02	.02	.00	48.	1.01	22.55	275	.01	.01	.00	22.
1.01	10.30	126	.02	.02	.00	48.	1.01	23.00	276	.01	.01	.00	22.
1.01	10.35	127	.02	.02	.00	48.	1.01	23.05	277	.01	.01	.00	22.
1.01	10.40	128	.02	.02	.00	48.	1.01	23.10	278	.01	.01	.00	22.
1.01	10.45	129	.02	.02	.00	48.	1.01	23.15	279	.01	.01	.00	22.
1.01	10.50	130	.02	.02	.00	48.	1.01	23.20	280	.01	.01	.00	22.
1.01	10.55	131	.02	.02	.00	48.	1.01	23.25	281	.01	.01	.00	22.
1.01	11.00	132	.02	.02	.00	48.	1.01	23.30	282	.01	.01	.00	22.
1.01	11.05	133	.02	.02	.00	48.	1.01	23.35	283	.01	.01	.00	22.
1.01	11.10	134	.02	.02	.00	48.	1.01	23.40	284	.01	.01	.00	22.
1.01	11.15	135	.02	.02	.00	48.	1.01	23.45	285	.01	.01	.00	22.
1.01	11.20	136	.02	.02	.00	48.	1.01	23.50	286	.01	.01	.00	22.
1.01	11.25	137	.02	.02	.00	48.	1.01	23.55	287	.01	.01	.00	22.
1.01	11.30	138	.02	.02	.00	48.	1.02	0.00	288	.01	.01	.00	22.
1.01	11.35	139	.02	.02	.00	48.	1.02	.05	289	0.00	0.00	0.00	20.
1.01	11.40	140	.02	.02	.00	48.	1.02	.10	290	0.00	0.00	0.00	19.
1.01	11.45	141	.02	.02	.00	48.	1.02	.15	291	0.00	0.00	0.00	18.
1.01	11.50	142	.02	.02	.00	48.	1.02	.20	292	0.00	0.00	0.00	16.
1.01	11.55	143	.02	.02	.00	48.	1.02	.25	293	0.00	0.00	0.00	15.
1.31	12.00	144	.02	.02	.00	48.	1.02	.30	294	0.00	0.00	0.00	14.
1.01	12.05	145	.17	.16	.00	60.	1.02	.35	295	0.00	0.00	0.00	13.
1.01	12.10	146	.17	.16	.00	136.	1.02	.40	296	0.00	0.00	0.00	12.
1.01	12.15	147	.17	.16	.00	224.	1.02	.45	297	0.00	0.00	0.00	12.
1.01	12.20	148	.17	.16	.00	293.	1.02	.50	298	0.00	0.00	0.00	11.
1.01	12.25	149	.17	.16	.00	331.	1.02	.55	299	0.00	0.00	0.00	10.
1.31	12.30	150	.17	.16	.00	353.	1.02	1.00	300	0.00	0.00	0.00	9.
									SUM	23.05	22.10	1.47	52489.
										(401.11	564.11	37.11	1486.29)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2630.	636.	182.	175.	52479.
CMS	75.	18.	5.	5.	1486.
INCHES		19.72	22.60	22.60	22.60
MM		501.01	574.66	574.62	574.02
AC-FT		315.	361.	361.	361.
THOUS CU M		389.	446.	446.	446.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	4.	6.	8.
10.	10.	11.	11.	11.	14.	11.	33.	11.	11.
11.	11.	13.	21.	31.	39.	43.	45.	46.	47.
48.	44.	48.	48.	48.	48.	48.	48.	48.	48.
48.	44.	44.	48.	48.	48.	48.	48.	48.	48.
48.	44.	44.	48.	48.	48.	48.	49.	48.	48.
48.	44.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	69.	130.	224.	293.	331.	353.
366.	379.	377.	370.	381.	382.	387.	403.	424.	440.
469.	456.	457.	456.	459.	460.	460.	466.	466.	492.
523.	547.	566.	568.	572.	575.	576.	577.	578.	578.
569.	534.	553.	626.	753.	1420.	1649.	2432.	2659.	2354.
1644.	1434.	1130.	958.	759.	664.	613.	586.	561.	550.
544.	541.	540.	539.	532.	547.	477.	453.	439.	431.
427.	429.	423.	422.	422.	422.	366.	313.	213.	132.
124.	119.	108.	100.	94.	87.	82.	76.	71.	66.
62.	58.	54.	50.	47.	44.	41.	38.	35.	33.
31.	29.	27.	25.	23.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	20.	19.
18.	16.	15.	14.	13.	12.	12.	11.	10.	9.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2659.	634.	182.	175.	52676.
CMS	75.	18.	5.	5.	1490.
INCHES		20.72	22.60	22.60	22.60
MM		526.81	574.00	574.02	574.42
AC-FT		915.	361.	364.	361.
THOUS CU M		369.	446.	446.	446.

HYDROGRAPH ROUTING

ADJUSTED FLOWS THROUGH RESERVOIR

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

CLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.040	0.000	0.000	560.	0

CAPACITY=	0.	20.	60.	140.	335.	465.	340.	580.	640.	830.
ELEVATION=	370.	390.	400.	410.	420.	425.	427.	428.	430.	435.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
430.0	50.0	2.9	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
430.0	3.1	1.5	410.

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STATION 2, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	2.	2.	3.	3.
4.	4.	5.	6.	6.	7.	8.	8.	9.	10.
10.	11.	12.	12.	13.	14.	14.	15.	16.	16.
17.	18.	18.	19.	20.	20.	21.	22.	22.	23.
23.	24.	25.	25.	26.	26.	27.	27.	28.	28.
29.	29.	30.	30.	31.	31.	32.	32.	32.	33.
33.	34.	34.	34.	35.	35.	35.	36.	36.	36.
37.	37.	37.	38.	38.	40.	44.	50.	59.	66.
76.	90.	99.	110.	120.	131.	141.	152.	164.	176.
188.	200.	213.	224.	230.	247.	259.	269.	278.	289.
300.	313.	326.	341.	360.	393.	421.	446.	469.	489.
506.	513.	519.	532.	563.	631.	794.	1171.	1546.	1801.
1941.	1830.	1652.	1454.	1266.	1106.	978.	878.	801.	762.
698.	661.	635.	614.	597.	581.	563.	543.	524.	507.
493.	480.	476.	462.	455.	449.	443.	428.	402.	370.
343.	329.	317.	305.	294.	283.	272.	262.	253.	244.
237.	224.	214.	210.	202.	195.	188.	181.	174.	168.
162.	156.	151.	145.	141.	135.	131.	126.	122.	118.
114.	110.	107.	104.	100.	97.	95.	92.	89.	87.
85.	82.	80.	78.	76.	74.	72.	71.	69.	67.
66.	64.	63.	62.	60.	59.	58.	57.	56.	55.
54.	53.	52.	51.	50.	49.	48.	47.	47.	46.
45.	44.	43.	43.	42.	41.	40.	39.	39.	38.

STORAGE

580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
580.	580.	580.	580.	580.	580.	580.	580.	580.	580.
581.	581.	581.	581.	581.	582.	582.	582.	582.	583.
583.	583.	584.	584.	584.	585.	585.	585.	585.	586.
586.	586.	586.	587.	587.	587.	587.	588.	588.	588.
588.	589.	589.	589.	589.	589.	589.	590.	590.	590.
590.	590.	590.	591.	591.	591.	591.	591.	591.	592.
592.	592.	592.	592.	592.	592.	592.	593.	593.	593.
593.	593.	593.	593.	593.	593.	593.	593.	594.	594.
594.	594.	594.	594.	594.	595.	596.	597.	599.	601.
603.	605.	607.	608.	610.	612.	614.	615.	617.	619.
621.	623.	624.	626.	627.	629.	630.	632.	633.	634.
636.	637.	639.	640.	642.	643.	644.	645.	646.	647.
647.	648.	644.	648.	649.	651.	656.	663.	671.	677.
678.	676.	673.	670.	666.	663.	660.	658.	656.	654.
653.	652.	651.	651.	650.	650.	649.	649.	648.	648.
647.	647.	646.	646.	646.	646.	645.	645.	644.	642.
641.	639.	638.	636.	635.	634.	632.	631.	630.	628.
627.	626.	625.	624.	623.	622.	621.	620.	619.	618.
617.	616.	615.	614.	614.	613.	612.	611.	611.	610.
609.	609.	608.	607.	607.	606.	606.	605.	605.	604.
604.	604.	603.	603.	602.	602.	602.	601.	601.	601.
600.	600.	600.	599.	599.	599.	599.	598.	598.	598.
598.	597.	597.	597.	597.	597.	596.	596.	596.	596.
596.	596.	595.	595.	595.	595.	595.	594.	594.	594.

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```
                                                  STAGE
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3     428.3
      428.3     428.3     428.4     428.4     428.4     428.4     428.4     428.4     428.4     428.4
      428.4     428.4     428.4     428.4     428.5     428.5     428.5     428.5     428.5     428.5
      428.5     428.5     428.5     428.5     428.5     428.5     428.5     428.5     428.5     428.5
      428.5     428.6     428.6     428.6     428.6     428.5     428.6     428.6     428.6     428.6
      428.6     428.6     428.6     428.6     428.6     428.6     428.6     428.6     428.6     428.6
      428.6     428.6     428.6     428.6     428.6     428.6     428.6     428.6     428.6     428.6
      428.7     428.7     428.7     428.7     428.7     428.7     428.7     428.7     428.8     428.9
      428.9     429.0     429.0     429.1     429.1     429.2     429.2     429.3     429.3     429.4
      429.4     429.5     429.5     429.6     429.6     429.7     429.7     429.8     429.8     429.8
      429.9     429.9     430.0     430.0     430.1     430.1     430.1     430.1     430.2     430.2
      430.2     430.2     430.2     430.2     430.2     430.3     430.4     430.6     430.4     431.0
      431.0     431.0     430.9     430.6     430.7     430.6     430.5     430.5     430.4     430.4
      430.3     430.3     430.3     430.3     430.3     430.3     430.2     430.2     430.2     430.2
      430.2     430.2     430.2     430.2     430.2     430.1     430.1     430.1     430.1     430.1
      430.0     430.0     429.9     429.9     429.9     429.8     429.8     429.7     429.7     429.7
      429.6     429.6     429.6     429.5     429.5     429.5     429.6     429.6     429.4     429.4
      429.3     429.3     429.3     429.3     429.2     429.2     429.2     429.2     429.1     429.1
      429.1     429.1     429.1     429.0     429.0     429.0     429.0     429.0     429.0     429.0
      428.9     428.9     428.9     428.9     428.9     428.9     428.9     428.9     428.9     428.9
      428.8     428.8     428.8     428.8     428.8     428.8     428.8     428.8     428.8     428.8
      428.8     428.8     428.8     428.7     428.7     428.7     428.7     428.7     428.7     428.7
      428.7     428.7     428.7     428.7     428.7     428.7     428.7     428.7     428.7     428.7

PEAK OUTFLOW IS    1961. AT TIME  15.92 HOURS

                          PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                 CFS     1961.     573.      175.      160.        50450.
                 CMS       55.      16.        5.        5.         1429.
              INCHES              17.78     21.73     21.73         21.73
                  MM             451.54    551.86    551.86        551.86
               AC-FT               284.      347.      347.          347.
          THOUS CU M               351.      429.      429.          429.
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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 2 TO 3

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	6	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	1	1	6	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
0	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVT	ELMAX	RLNTH	SEL
.1000	.0500	.1000	360.0	380.0	400.	.07000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 393.00 25.00 370.00 125.00 381.00 129.00 380.00 195.00 380.00
295.00 381.00 250.00 370.00 325.00 380.00

STORAGE	0.00	.24	.81	1.20	2.02	3.06	4.33	5.83	7.59	9.50
	11.66	13.94	16.32	18.88	21.30	24.06	26.85	29.73	32.72	35.81
OUTFLOW	0.00	203.07	683.43	1406.76	2673.13	4296.94	6439.38	9059.15	12292.86	16139.37
	20487.85	26482.00	32733.55	39630.96	47160.03	55403.10	64295.50	73841.15	84077.88	95004.68
STAGE	380.00	381.05	382.11	383.16	384.21	385.26	386.32	387.37	388.42	389.47
	390.53	391.58	392.63	393.68	394.74	395.79	396.84	397.89	398.95	400.00
FLOW	0.00	203.07	683.43	1406.76	2673.13	4296.94	6439.38	9059.15	12292.86	16139.37
	20487.85	26482.00	32733.55	39630.96	47160.03	55403.10	64295.50	73841.15	84077.88	95004.68

STATION 3, PLAN 1, ITER 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	2.	2.	3.	3.
4.	4.	5.	6.	6.	7.	8.	9.	9.	9.
10.	11.	12.	12.	13.	14.	14.	15.	16.	16.
17.	18.	18.	19.	20.	20.	21.	21.	22.	23.
23.	24.	24.	25.	26.	26.	27.	27.	28.	28.
29.	29.	30.	30.	31.	31.	31.	32.	32.	33.
33.	34.	34.	34.	35.	35.	36.	36.	36.	36.
37.	37.	37.	38.	38.	40.	43.	49.	57.	66.
76.	86.	97.	110.	119.	129.	140.	150.	162.	176.
190.	199.	211.	223.	235.	246.	257.	267.	277.	287.
299.	312.	325.	339.	362.	361.	414.	444.	467.	487.
512.	537.	564.	590.	616.	621.	771.	1674.	1444.	1430.
1941.	1475.	1675.	1474.	1266.	1122.	941.	807.	808.	767.
741.	695.	637.	614.	589.	583.	565.	545.	928.	909.
494.	482.	471.	463.	456.	450.	443.	436.	416.	374.
348.	330.	314.	306.	295.	284.	274.	263.	254.	245.
236.	227.	219.	211.	203.	196.	189.	182.	176.	169.
163.	157.	152.	146.	141.	136.	131.	127.	123.	119.
115.	111.	107.	104.	101.	98.	95.	92.	90.	87.
84.	82.	81.	78.	76.	75.	73.	71.	69.	68.
66.	64.	63.	62.	61.	59.	58.	57.	56.	55.
54.	53.	52.	51.	50.	49.	48.	48.	47.	46.
45.	44.	44.	43.	42.	41.	40.	39.	39.	38.

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STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1
360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1
360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1	360.1
360.1	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2
360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2
360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.3	360.3	360.3
360.4	360.4	360.5	360.6	360.6	360.7	360.7	360.8	360.8	360.9
361.0	361.0	361.1	361.1	361.1	361.1	361.2	361.2	361.2	361.2
361.3	361.3	361.3	361.4	361.4	361.5	361.5	361.6	361.6	361.7
361.7	361.7	361.7	361.8	361.8	362.0	362.2	362.6	363.2	363.5
363.6	363.5	363.3	363.1	362.9	362.7	362.5	362.4	362.3	362.2
362.1	362.1	362.0	362.0	361.9	361.9	361.8	361.8	361.8	361.7
361.7	361.7	361.6	361.5	361.6	361.6	361.6	361.5	361.5	361.4
361.4	361.3	361.3	361.3	361.3	361.2	361.2	361.2	361.2	361.1
361.1	361.1	361.1	361.1	361.0	361.0	361.0	360.9	360.9	360.9
360.8	360.9	360.8	360.8	360.7	360.7	360.7	360.7	360.6	360.6
360.6	360.6	360.6	360.5	360.5	360.5	360.5	360.5	360.5	360.5
360.4	360.4	360.4	360.4	360.4	360.4	360.4	360.4	360.4	360.3
360.3	360.3	360.3	360.3	360.3	360.3	360.3	360.3	360.3	360.3
360.3	360.3	360.3	360.3	360.3	360.3	360.2	360.2	360.2	360.2
360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2	360.2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1941.	573.	175.	169.	50443.
CMS	55.	16.	5.	5.	1428.
INCHES		17.78	21.72	21.72	21.72
MM		451.94	551.79	551.79	551.79
AC-FT		284.	347.	347.	347.
THOUS CU M		351.	429.	429.	429.

MAXIMUM STORAGE = 2.

MAXIMUM STAGE IS 363.6

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.30	1	1	0	0	0

NSTPS	NSTAL	LAG	AMSKK	X	TSK	STORA	ISPRAT
010300000		0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QME(1)	QME(2)	QME(3)	FLPVF	ELMAX	ELMIN	SEL
.1000	.1030	.1000	300.0	330.0	1400.	.04360

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 330.00 150.00 310.00 240.00 303.00 240.00 300.00 265.00 300.00
265.00 303.00 270.00 310.00 450.00 330.00

STORAGE	0.00	1.27	3.55	5.82	9.49	15.97	24.45	34.71	46.83	58.35
	71.67	95.99	101.31	117.64	136.97	153.30	172.63	192.96	214.29	236.61
OUTFLOW	0.00	152.77	455.07	949.94	2037.74	3771.66	6372.84	10190.01	15129.97	21103.67
	28141.05	36241.32	45562.88	56027.96	67718.35	80676.37	94944.36	110564.52	127578.76	146028.68
STAGE	300.00	301.14	303.16	304.76	306.32	307.89	309.47	311.05	312.63	314.21
	315.79	317.37	314.95	320.53	322.11	323.68	325.26	326.84	328.42	330.00
FLOW	0.00	152.77	455.07	949.94	2037.74	3771.66	6372.84	10190.01	15129.97	21103.07
	28141.05	36241.32	45562.88	56027.96	67718.35	80676.37	94944.36	110564.52	127578.76	146028.68

STATION 4, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	2.	2.	3.
3.	4.	4.	5.	5.	6.	7.	7.	8.	9.
9.	10.	11.	11.	12.	13.	13.	14.	15.	15.
16.	17.	17.	18.	19.	19.	20.	21.	21.	22.
23.	23.	24.	24.	25.	25.	26.	27.	27.	28.
29.	29.	29.	30.	30.	31.	31.	32.	32.	32.
33.	33.	33.	34.	34.	35.	35.	35.	36.	36.
36.	37.	37.	37.	38.	38.	40.	44.	49.	57.
65.	75.	85.	95.	106.	116.	127.	136.	146.	163.
178.	191.	203.	216.	228.	239.	250.	261.	271.	281.
292.	304.	317.	331.	349.	374.	401.	428.	452.	473.
492.	509.	514.	523.	541.	583.	644.	801.	1241.	1621.
1466.	1404.	1272.	1508.	1404.	1220.	1075.	955.	862.	789.
733.	690.	656.	631.	611.	594.	577.	559.	539.	520.
504.	490.	478.	469.	461.	454.	447.	439.	42..	403.
383.	367.	350.	313.	332.	291.	280.	274.	260.	250.
241.	237.	224.	216.	208.	201.	193.	186.	180.	173.
167.	161.	155.	151.	147.	142.	137.	132.	126.	126.
116.	116.	112.	108.	105.	102.	99.	96.	93.	90.
88.	87.	83.	81.	79.	77.	75.	73.	71.	70.
68.	67.	65.	64.	62.	61.	60.	58.	57.	56.
55.	54.	53.	52.	51.	50.	49.	49.	48.	47.
46.	45.	45.	44.	43.	42.	41.	40.	43.	39.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	3.	3.
3.	3.	3.	3.	3.	3.	4.	5.	6.	8.
9.	9.	8.	8.	7.	6.	5.	5.	4.	4.
4.	4.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
300.0	300.0	300.0	300.0	300.1	300.1	300.1	300.1	300.1	300.1
300.1	300.1	300.1	300.1	300.1	300.1	300.1	300.1	300.2	300.2
300.2	300.2	300.2	300.2	300.2	300.2	300.2	300.2	300.2	300.2
300.2	300.2	300.2	300.3	300.3	300.3	300.3	300.3	300.3	300.3
300.3	300.3	300.3	300.3	300.3	300.3	300.3	300.3	300.3	300.3
300.3	300.3	300.3	300.3	300.4	300.4	300.4	300.4	300.4	300.4
300.4	300.4	300.4	300.4	300.4	300.4	300.4	300.5	300.5	300.6
300.7	300.8	300.9	301.0	301.1	301.2	301.3	301.4	301.5	301.6
301.7	301.9	301.8	301.9	302.0	302.0	302.1	302.1	302.2	302.2
302.3	302.4	302.4	302.5	302.6	302.7	302.9	303.0	303.1	303.2
303.3	303.3	303.3	303.4	303.4	303.5	303.8	304.4	305.1	305.7
304.0	304.1	305.4	305.6	305.4	305.1	304.9	304.6	304.3	304.1
304.0	303.9	303.7	303.7	303.6	303.6	303.5	303.5	303.4	303.3
303.3	303.3	303.2	303.2	303.2	303.2	303.1	303.1	303.0	302.8
302.7	302.6	302.5	302.4	302.4	302.3	302.2	302.2	302.1	302.1
302.0	302.0	302.0	301.9	301.9	301.9	301.8	301.8	301.7	301.7
301.7	301.6	301.6	301.6	301.5	301.5	301.4	301.4	301.3	301.3
301.2	301.2	301.2	301.1	301.1	301.1	301.0	301.0	301.0	300.9
300.9	300.9	300.9	300.9	300.8	300.9	300.8	300.8	300.7	300.7
300.7	300.7	300.7	300.7	300.6	300.6	300.6	300.6	300.6	300.6
300.6	300.6	300.5	300.5	300.5	300.5	300.5	300.5	300.5	300.5
300.5	300.5	300.5	300.5	300.4	300.4	300.4	300.4	300.4	300.4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1834.	573.	175.	160.	50397.
CMS	54.	16.	5.	5.	1427.
INCHES		17.70	21.70	21.70	21.70
MM		451.51	551.28	551.28	551.28
AC-FT		284.	347.	347.	347.
THOUS CU M		351.	428.	428.	428.

MAXIMUM STORAGE = 9.

MAXIMUM STAGE IS 304.1

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	4	0	1	4	0

ROUTING DATA

METRIC	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.30	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	0100000J0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QMIN	QMAX	QMIN	FLPUT	ELMAX	ELMIN	SEL
.1000	.1000	.1000	296.0	310.0	400.	.02500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

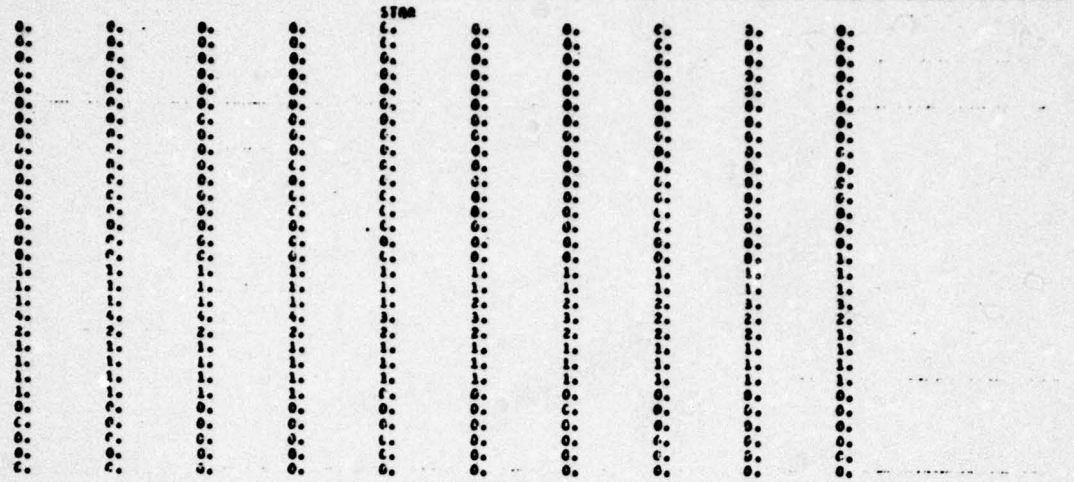
0.00	312.00	300.30	300.00	675.00	291.00	679.00	290.00	700.00	290.00
700.00	291.00	993.30	300.00	950.00	310.00				

STORAGE	6.03	.24	.78	1.85	3.46	5.61	8.30	11.52	15.28	19.57
	24.38	29.47	35.12	41.62	47.28	53.89	60.86	68.19	75.87	83.91
OUTFLOW	0.00	60.96	244.66	684.63	1492.20	2761.12	4575.85	7014.48	10150.38	14053.15
	18962.01	24867.43	31673.80	39339.44	47921.84	57447.16	67944.84	79444.36	91975.73	105568.02
STAGE	296.00	291.05	292.11	293.16	294.21	295.26	296.32	297.37	298.42	299.47
	300.53	301.58	302.63	303.68	304.74	305.79	306.84	307.89	308.95	311.00
FLOW	0.00	60.96	244.66	684.63	1492.20	2761.12	4575.85	7014.48	10150.38	14053.15
	18962.01	24867.43	31673.80	39339.44	47921.84	57447.16	67944.84	79444.36	91975.73	105568.02

STATION 5, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	2.	2.	2.
3.	3.	4.	4.	5.	6.	6.	7.	8.	9.
9.	10.	10.	11.	12.	12.	13.	14.	14.	15.
16.	16.	17.	18.	18.	19.	20.	20.	21.	22.
22.	23.	23.	24.	25.	25.	26.	26.	27.	27.
28.	29.	29.	29.	30.	30.	31.	31.	32.	32.
32.	33.	33.	34.	34.	34.	35.	35.	35.	36.
36.	36.	37.	37.	37.	38.	39.	42.	46.	52.
60.	70.	80.	91.	101.	112.	122.	133.	144.	157.
172.	189.	198.	210.	223.	236.	245.	257.	267.	277.
290.	306.	312.	326.	342.	364.	391.	418.	444.	466.
489.	501.	511.	520.	534.	567.	643.	821.	1131.	1512.
1818.	1907.	1846.	1643.	1454.	1278.	1117.	968.	826.	809.
745.	701.	667.	640.	618.	600.	583.	565.	546.	527.
510.	495.	482.	472.	463.	456.	450.	441.	427.	408.
374.	349.	330.	318.	308.	295.	286.	273.	263.	254.
244.	232.	228.	219.	211.	204.	195.	189.	182.	178.
169.	163.	159.	153.	148.	144.	139.	136.	133.	125.
121.	117.	113.	110.	106.	103.	100.	97.	94.	92.
89.	87.	84.	82.	80.	78.	76.	74.	72.	70.
66.	67.	65.	64.	63.	62.	60.	59.	58.	57.
56.	55.	54.	53.	52.	51.	50.	49.	48.	47.
47.	46.	45.	44.	43.	43.	42.	41.	41.	39.



STAGE

296.4	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.4	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.4	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0	296.0
296.0	296.1	296.1	296.1	296.1	296.1	296.1	296.1	296.1	296.1
296.2	296.2	296.2	296.2	296.2	296.2	296.2	296.2	296.2	296.2
296.3	296.3	296.3	296.3	296.3	296.3	296.3	296.4	296.4	296.4
296.4	296.4	296.4	296.4	296.4	296.4	296.4	296.5	296.5	296.5
296.5	296.5	296.5	296.5	296.5	296.5	296.5	296.5	296.5	296.6
296.6	296.4	296.6	296.6	296.6	296.6	296.6	296.6	296.6	296.6
296.6	296.6	296.6	296.6	296.6	296.7	296.7	296.7	296.8	296.9
297.0	297.1	297.2	297.2	297.3	297.3	297.4	297.5	297.5	297.6
297.7	297.8	297.8	297.9	298.0	298.0	298.1	298.1	298.2	298.2
298.2	298.2	298.3	298.3	298.3	298.4	298.5	298.5	298.6	298.6
298.7	298.7	298.7	298.8	298.8	298.9	298.9	299.0	299.1	299.1
299.2	299.2	299.3	299.3	299.4	299.4	299.5	299.6	299.6	299.7
299.7	299.7	299.8	299.8	299.9	299.9	300.0	300.0	300.1	300.1
300.2	300.2	300.3	300.3	300.3	300.4	300.4	300.5	300.5	300.6
300.6	300.7	300.7	300.8	300.8	300.8	300.9	300.9	301.0	301.0
301.1	301.1	301.2	301.2	301.3	301.3	301.4	301.4	301.5	301.5
301.6	301.6	301.7	301.7	301.8	301.8	301.9	301.9	302.0	302.0
302.1	302.1	302.2	302.2	302.3	302.3	302.4	302.4	302.5	302.5
302.6	302.6	302.7	302.7	302.8	302.8	302.9	302.9	303.0	303.0
303.1	303.1	303.2	303.2	303.3	303.3	303.4	303.4	303.5	303.5
303.6	303.6	303.7	303.7	303.8	303.8	303.9	303.9	304.0	304.0
304.1	304.1	304.2	304.2	304.3	304.3	304.4	304.4	304.5	304.5
304.6	304.6	304.7	304.7	304.8	304.8	304.9	304.9	305.0	305.0
305.1	305.1	305.2	305.2	305.3	305.3	305.4	305.4	305.5	305.5
305.6	305.6	305.7	305.7	305.8	305.8	305.9	305.9	306.0	306.0
306.1	306.1	306.2	306.2	306.3	306.3	306.4	306.4	306.5	306.5
306.6	306.6	306.7	306.7	306.8	306.8	306.9	306.9	307.0	307.0
307.1	307.1	307.2	307.2	307.3	307.3	307.4	307.4	307.5	307.5
307.6	307.6	307.7	307.7	307.8	307.8	307.9	307.9	308.0	308.0
308.1	308.1	308.2	308.2	308.3	308.3	308.4	308.4	308.5	308.5
308.6	308.6	308.7	308.7	308.8	308.8	308.9	308.9	309.0	309.0
309.1	309.1	309.2	309.2	309.3	309.3	309.4	309.4	309.5	309.5
309.6	309.6	309.7	309.7	309.8	309.8	309.9	309.9	310.0	310.0
310.1	310.1	310.2	310.2	310.3	310.3	310.4	310.4	310.5	310.5
310.6	310.6	310.7	310.7	310.8	310.8	310.9	310.9	311.0	311.0
311.1	311.1	311.2	311.2	311.3	311.3	311.4	311.4	311.5	311.5
311.6	311.6	311.7	311.7	311.8	311.8	311.9	311.9	312.0	312.0
312.1	312.1	312.2	312.2	312.3	312.3	312.4	312.4	312.5	312.5
312.6	312.6	312.7	312.7	312.8	312.8	312.9	312.9	313.0	313.0
313.1	313.1	313.2	313.2	313.3	313.3	313.4	313.4	313.5	313.5
313.6	313.6	313.7	313.7	313.8	313.8	313.9	313.9	314.0	314.0
314.1	314.1	314.2	314.2	314.3	314.3	314.4	314.4	314.5	314.5
314.6	314.6	314.7	314.7	314.8	314.8	314.9	314.9	315.0	315.0
315.1	315.1	315.2	315.2	315.3	315.3	315.4	315.4	315.5	315.5
315.6	315.6	315.7	315.7	315.8	315.8	315.9	315.9	316.0	316.0
316.1	316.1	316.2	316.2	316.3	316.3	316.4	316.4	316.5	316.5
316.6	316.6	316.7	316.7	316.8	316.8	316.9	316.9	317.0	317.0
317.1	317.1	317.2	317.2	317.3	317.3	317.4	317.4	317.5	317.5
317.6	317.6	317.7	317.7	317.8	317.8	317.9	317.9	318.0	318.0
318.1	318.1	318.2	318.2	318.3	318.3	318.4	318.4	318.5	318.5
318.6	318.6	318.7	318.7	318.8	318.8	318.9	318.9	319.0	319.0
319.1	319.1	319.2	319.2	319.3	319.3	319.4	319.4	319.5	319.5
319.6	319.6	319.7	319.7	319.8	319.8	319.9	319.9	320.0	320.0

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1807.	973.	175.	168.	56374.
CMS	54.	16.	5.	5.	1426.
INCHES		17.78	21.69	21.69	21.69
MM		451.49	551.03	551.03	551.03
AC-FT		294.	347.	347.	347.
THOUS CU M		351.	428.	428.	428.

MAXIMUM STORAGE = 4.

MAXIMUM STAGE IS 296.9

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 .25	RATIO 2 .50	RATIOS APPLIED TO FLOWS RATIO 3 .75	RATIO 4 1.00
HYDROGRAPH AT	1	.30	1	669.	1329.	1964.	2650.
	(	.781		18.823(	37.641(	56.461(	75.281(
ROUTED TO	2	.30	1	196.	619.	1326.	1941.
	(	.781		5.551(	17.531(	37.541(	54.951(
ROUTED TO	3	.30	1	196.	620.	1322.	1941.
	(	.781		5.551(	17.561(	37.421(	54.971(
ROUTED TO	4	.30	1	196.	609.	1304.	1894.
	(	.781		5.541(	17.261(	36.931(	53.631(
ROUTED TO	5	.30	1	195.	611.	1293.	1897.
	(	.781		5.531(	17.311(	36.621(	53.711(

SUMMARY OF DAM SAFETY ANALYSIS — Flashboard, No Breach

PLAN 1 ..... INITIAL VALUE | SPILLWAY CREST | TOP OF DAM

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	428.25	428.25	430.00
STORAGE	584.	584.	844.
OUTFLOW	0.	6.	336.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.25	429.47	0.00	622.	196.	0.00	14.25	0.00
.50	430.29	.29	651.	619.	1.33	14.08	0.00
.75	430.71	.71	667.	1326.	2.75	15.92	0.00
1.00	431.00	1.00	678.	1941.	4.00	15.92	0.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	196.	361.8	14.25
.50	620.	362.4	14.08
.75	1322.	362.9	15.92
1.00	1941.	363.6	15.92

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	196.	301.8	16.33
.50	609.	303.6	16.17
.75	1304.	305.2	16.00
1.00	1894.	306.1	16.00

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	195.	291.8	16.33
.50	611.	293.6	16.17
.75	1293.	294.8	16.00
1.00	1897.	295.5	16.00

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  25 SEP 79
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    1          A1       NEW APOSEY DAM SAFETY - GREAT NOTCH RESERVOIR DAM  I.D. NO. 00244
    2          A2       HYDRAULIC-HYDROLOGIC ANALYSIS   302-03
    3          A3       PROBABLE MAXIMUM FLOOD                                    -SSE-
    4          B   300      0       5       0       0       0       0       0       0       0
    5          B1    5
    6          J     1       4       1
    7          J1  0.25     0.5    0.75     2.0
    8          K     0       1                                               1
    9          K1                    INFLOW HYDROGRAPH TO RESERVOIR
   10          M     1       2      0.3              0.8                                     1
   11          P           22.4     113     123     132
   12          I                                                       0.5    0.05
   13          M2          0.2
   14          K    -1      -.05    2.0
   15          K     1       2                                               1
   16          K1                    ROUTED FLOWS THROUGH RESERVOIR
   17          V                             1       1
   18          V1    1                                                 580
   19          R1    C      23      66     140     335     465     543     580     640     636
   20          R2  370     390     460     410     420     425     427  426.25     430     435
   21          R3426.25     50     2.0     1.5
   22          R0  430     3.1     1.5     410
   23          R4    0    0.98     370       1  426.25     430
   24          K     1       3                                               1
   25          K1        CHANNEL ROUTING -MODIFIED PULS- STATION 2 TO 3
   26          V                             1       1
   27          V1    1
   28          V4  0.10    0.05    0.10     360     380     400    0.67
   29          V7    0     340      25     370     125     361     125     360     190     360
   30          V7  140     361     250     370     325     380
   31          K     1       4                                               1
   32          K1        CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4
   33          V                             1       1
   34          V1    1
   35          V4  .10     .10     .10     360     330    1440   0.043
   36          V7    0     330     150     310     240     303     240     300     265     300
   37          V7  265     303     350     310     450     330
   38          K     1       5                                               1
   39          K1        CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5
   40          V                             1       1
   41          V1    1
   42          V4  0.10    0.10    0.10     290     310     400   0.025
   43          V7    0     310     330     360     675     291     675     290     700     290
   44          V7  700     291     860     300     850     310
   45          K    99
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Analysis Assuming Flashboards and Breach.

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PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
ROUTE HYDROGRAPH TO	4
ROUTE HYDROGRAPH TO	5
END OF NETWORK	

NEW JERSEY DAM SAFETY - GREAT NOTCH RESERVOIR DAM I.D. NO. 00244
HYDRAULIC-HYDROLOGIC ANALYSIS 302-03
PROBABLE MAXIMUM FLOOD -DBE-

JOB SPECIFICATION

NO	NMO	MMIN	ISAV	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	5	0	0	0	0	0	0	0
			JOPER	HVT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1
RTIOS= .25 .50 .75 1.00

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO RESERVOIR

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	1	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.33	0.06	.30	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.40	113.00	123.00	132.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	.50	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .20

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 14 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .20 VOL= 1.00

146.	492.	598.	478.	266.	158.	87.	50.	28.	16.	
9.	6.	3.	1.							

0 END-OF-PERIOD FLOW

HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP 0	HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP 0
1.01	.05	1	.01	0.00	.01	0.	1.01	12.35	151	.17	.16	.00	366.
1.01	.10	2	.01	0.00	.01	0.	1.01	12.40	152	.17	.16	.00	373.
1.01	.15	3	.01	0.00	.01	0.	1.01	12.45	153	.17	.16	.00	377.
1.01	.20	4	.01	0.00	.01	0.	1.01	12.50	154	.17	.16	.00	379.
1.01	.25	5	.01	0.00	.01	0.	1.01	12.55	155	.17	.16	.00	381.
1.01	.30	6	.01	0.00	.01	0.	1.01	13.00	156	.17	.16	.00	382.
1.01	.35	7	.01	0.00	.01	0.	1.01	13.05	157	.20	.20	.00	387.
1.01	.40	8	.01	0.00	.01	0.	1.01	13.10	158	.20	.20	.00	403.
1.01	.45	9	.01	0.00	.01	0.	1.01	13.15	159	.20	.20	.00	424.
1.01	.50	10	.01	0.00	.01	0.	1.01	13.20	160	.20	.20	.00	440.
1.01	.55	11	.01	0.00	.01	0.	1.01	13.25	161	.20	.20	.00	449.
1.01	1.00	12	.01	0.00	.01	0.	1.01	13.30	162	.20	.20	.00	454.

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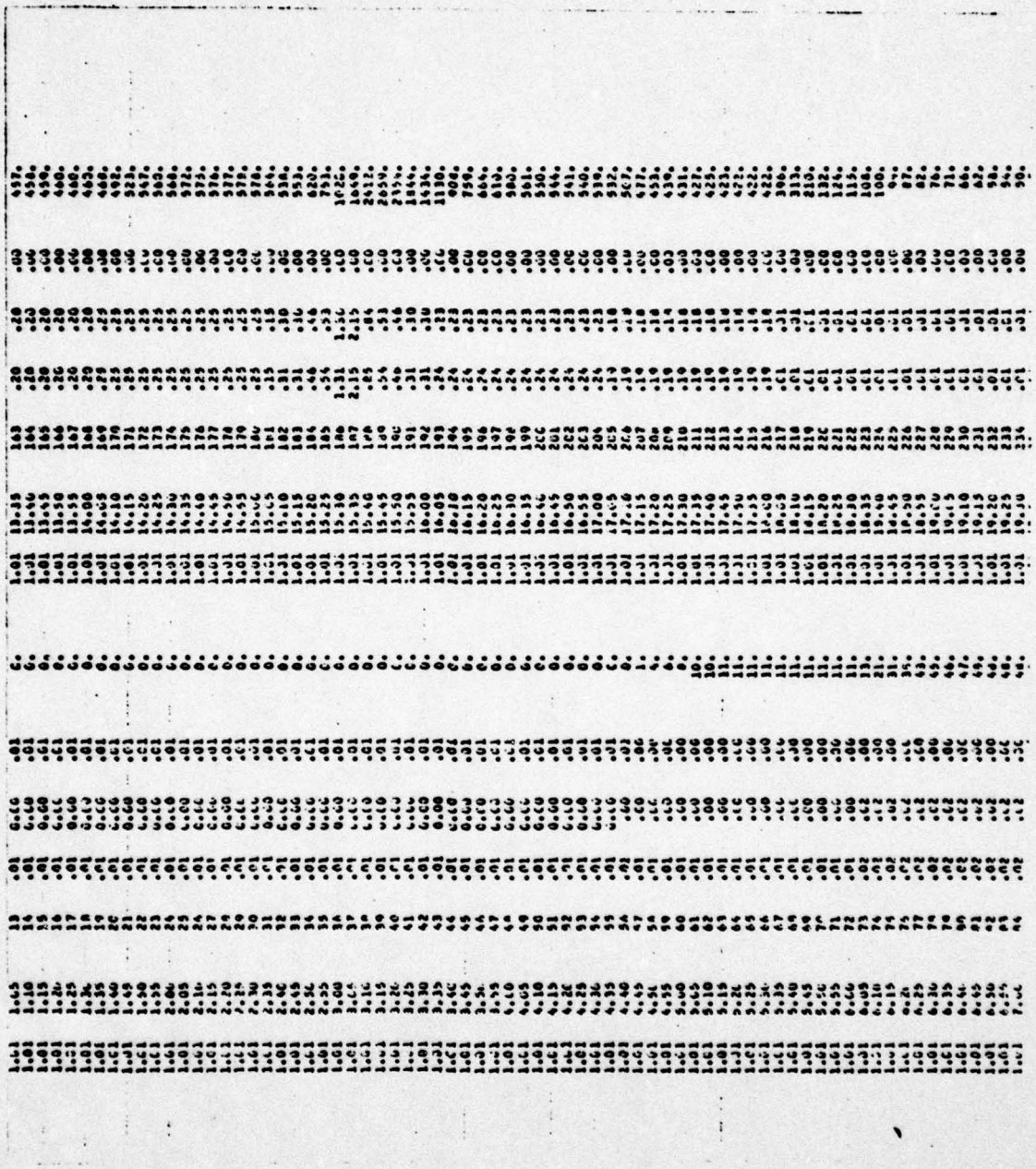

1.01	7.05	95	.02	.02	.00	48.	1.01	19.35	235	.01	.01	.00	47.
1.01	7.10	96	.02	.02	.00	48.	1.01	19.40	236	.01	.01	.00	46.
1.01	7.15	97	.02	.02	.00	48.	1.01	19.45	237	.01	.01	.00	45.
1.01	7.20	98	.02	.02	.00	48.	1.01	19.50	238	.01	.01	.00	44.
1.01	7.25	99	.02	.02	.00	48.	1.01	19.55	239	.01	.01	.00	43.
1.01	7.30	100	.02	.02	.00	48.	1.01	20.00	240	.01	.01	.00	42.
1.01	7.35	101	.02	.02	.00	48.	1.01	20.05	241	.01	.01	.00	41.
1.01	7.40	102	.02	.02	.00	48.	1.01	20.10	242	.01	.01	.00	40.
1.01	7.45	103	.02	.02	.00	48.	1.01	20.15	243	.01	.01	.00	39.
1.01	7.50	104	.02	.02	.00	48.	1.01	20.20	244	.01	.01	.00	38.
1.01	7.55	105	.02	.02	.00	48.	1.01	20.25	245	.01	.01	.00	37.
1.01	8.00	106	.02	.02	.00	48.	1.01	20.30	246	.01	.01	.00	36.
1.01	8.05	107	.02	.02	.00	48.	1.01	20.35	247	.01	.01	.00	35.
1.01	8.10	108	.02	.02	.00	48.	1.01	20.40	248	.01	.01	.00	34.
1.01	8.15	109	.02	.02	.00	48.	1.01	20.45	249	.01	.01	.00	33.
1.01	8.20	110	.02	.02	.00	48.	1.01	20.50	250	.01	.01	.00	32.
1.01	8.25	111	.02	.02	.00	48.	1.01	20.55	251	.01	.01	.00	31.
1.01	8.30	112	.02	.02	.00	48.	1.01	21.00	252	.01	.01	.00	30.
1.01	8.35	113	.02	.02	.00	48.	1.01	21.05	253	.01	.01	.00	29.
1.01	8.40	114	.02	.02	.00	48.	1.01	21.10	254	.01	.01	.00	28.
1.01	8.45	115	.02	.02	.00	48.	1.01	21.15	255	.01	.01	.00	27.
1.01	8.50	116	.02	.02	.00	48.	1.01	21.20	256	.01	.01	.00	26.
1.01	8.55	117	.02	.02	.00	48.	1.01	21.25	257	.01	.01	.00	25.
1.01	9.00	118	.02	.02	.00	48.	1.01	21.30	258	.01	.01	.00	24.
1.01	9.05	119	.02	.02	.00	48.	1.01	21.35	259	.01	.01	.00	23.
1.01	9.10	120	.02	.02	.00	48.	1.01	21.40	260	.01	.01	.00	22.
1.01	9.15	121	.02	.02	.00	48.	1.01	21.45	261	.01	.01	.00	22.
1.01	9.20	122	.02	.02	.00	48.	1.01	21.50	262	.01	.01	.00	22.
1.01	9.25	123	.02	.02	.00	48.	1.01	21.55	263	.01	.01	.00	22.
1.01	9.30	124	.02	.02	.00	48.	1.01	22.00	264	.01	.01	.00	22.
1.01	9.35	125	.02	.02	.00	48.	1.01	22.05	265	.01	.01	.00	22.
1.01	9.40	126	.02	.02	.00	48.	1.01	22.10	266	.01	.01	.00	22.
1.01	9.45	127	.02	.02	.00	48.	1.01	22.15	267	.01	.01	.00	22.
1.01	9.50	128	.02	.02	.00	48.	1.01	22.20	268	.01	.01	.00	22.
1.01	9.55	129	.02	.02	.00	48.	1.01	22.25	269	.01	.01	.00	22.
1.01	10.00	130	.02	.02	.00	48.	1.01	22.30	270	.01	.01	.00	22.
1.01	10.05	131	.02	.02	.00	48.	1.01	22.35	271	.01	.01	.00	22.
1.01	10.10	132	.02	.02	.00	48.	1.01	22.40	272	.01	.01	.00	22.
1.01	10.15	133	.02	.02	.00	48.	1.01	22.45	273	.01	.01	.00	22.
1.01	10.20	134	.02	.02	.00	48.	1.01	22.50	274	.01	.01	.00	22.
1.01	10.25	135	.02	.02	.00	48.	1.01	22.55	275	.01	.01	.00	22.
1.01	10.30	136	.02	.02	.00	48.	1.01	23.00	276	.01	.01	.00	22.
1.01	10.35	137	.02	.02	.00	48.	1.01	23.05	277	.01	.01	.00	22.
1.01	10.40	138	.02	.02	.00	48.	1.01	23.10	278	.01	.01	.00	22.
1.01	10.45	139	.02	.02	.00	48.	1.01	23.15	279	.01	.01	.00	22.
1.01	10.50	140	.02	.02	.00	48.	1.01	23.20	280	.01	.01	.00	22.
1.01	10.55	141	.02	.02	.00	48.	1.01	23.25	281	.01	.01	.00	22.
1.01	11.00	142	.02	.02	.00	48.	1.01	23.30	282	.01	.01	.00	22.
1.01	11.05	143	.02	.02	.00	48.	1.01	23.35	283	.01	.01	.00	22.
1.01	11.10	144	.02	.02	.00	48.	1.01	23.40	284	.01	.01	.00	22.
1.01	11.15	145	.02	.02	.00	48.	1.01	23.45	285	.01	.01	.00	22.
1.01	11.20	146	.02	.02	.00	48.	1.01	23.50	286	.01	.01	.00	22.
1.01	11.25	147	.02	.02	.00	48.	1.01	23.55	287	.01	.01	.00	22.
1.01	11.30	148	.02	.02	.00	48.	1.02	0.00	288	.01	.01	.00	22.
1.01	11.35	149	.02	.02	.00	48.	1.02	.05	289	0.00	0.00	0.00	20.
1.01	11.40	150	.02	.02	.00	48.	1.02	.10	290	0.00	0.00	0.00	19.
1.01	11.45	151	.02	.02	.00	48.	1.02	.15	291	0.00	0.00	0.00	18.
1.01	11.50	152	.02	.02	.00	48.	1.02	.20	292	0.00	0.00	0.00	16.
1.01	11.55	153	.02	.02	.00	48.	1.02	.25	293	0.00	0.00	0.00	15.
1.01	12.00	154	.01	.02	.00	48.	1.02	.30	294	0.00	0.00	0.00	14.
1.01	12.05	155	.17	.16	.00	60.	1.02	.35	295	0.00	0.00	0.00	13.
1.01	12.10	156	.17	.16	.00	138.	1.02	.40	296	0.00	0.00	0.00	12.
1.01	12.15	157	.17	.16	.00	224.	1.02	.45	297	0.00	0.00	0.00	12.
1.01	12.20	158	.17	.16	.00	293.	1.02	.50	298	0.00	0.00	0.00	11.
1.01	12.25	159	.17	.16	.00	331.	1.02	.55	299	0.00	0.00	0.00	10.
1.01	12.30	160	.17	.16	.00	353.	1.02	1.00	300	0.00	0.00	0.00	9.
									SUM	23.69	22.19	1.47	52488.
										(601.1(	564.1(	37.1(	1486.29)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2659.	636.	182.	175.	52478.
CMS	75.	18.	5.	5.	1486.
INCHES		19.72	22.60	22.60	22.60
MM		500.91	574.06	574.02	574.02
AC-FT		315.	361.	361.	361.
THOUS CU M		389.	446.	446.	446.

A-50

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	4.	4.	4.	4.
10.	10.	11.	11.	11.	11.	11.	11.	11.	11.
11.	11.	13.	21.	31.	38.	43.	45.	46.	47.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	48.	48.	48.	48.	48.	48.
48.	48.	48.	48.	49.	139.	224.	293.	331.	353.
366.	373.	377.	379.	381.	382.	387.	403.	426.	440.
449.	454.	457.	458.	459.	460.	460.	464.	468.	482.
528.	547.	562.	568.	572.	575.	578.	577.	574.	570.
564.	534.	553.	620.	753.	1020.	1649.	2412.	2659.	2354.
1844.	1494.	1138.	908.	759.	664.	610.	570.	561.	550.
544.	541.	540.	539.	532.	527.	477.	453.	439.	431.
427.	424.	423.	422.	422.	422.	395.	313.	260.	182.
124.	115.	108.	106.	96.	87.	82.	76.	71.	66.
62.	58.	54.	50.	47.	44.	41.	37.	35.	33.
31.	29.	27.	25.	23.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	20.	19.
18.	16.	15.	14.	13.	12.	12.	11.	10.	9.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2659.	638.	182.	175.	52470.
CMS	75.	18.	5.	5.	1486.
INCHES		10.72	22.60	22.60	22.60
MM		566.91	574.00	574.02	574.12
AC-FT		315.	361.	361.	361.
THOUS CU M		389.	446.	446.	446.

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH RESERVOIR

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.06	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	580.	0

CAPACITY=	0.	23.	60.	140.	335.	465.	540.	580.	640.	830.
ELEVATION=	370.	390.	400.	410.	420.	425.	427.	428.	430.	435.

CREL	SPWID	COOU	EXPU	ELEVL	COOL	CAREA	EXPL
428.5	50.0	2.9	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
430.0	3.1	1.5	410.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
0.	.50	370.00	1.00	428.25	430.00

STATION 2, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

*DUMP

STATION 2, PLAN 1, RATIO 4

BEGIN DAM FAILURE AT 14.50 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	2.	2.	3.	3.
4.	4.	5.	6.	6.	7.	8.	8.	9.	10.
10.	11.	12.	12.	13.	14.	14.	15.	16.	16.
17.	18.	18.	19.	20.	20.	21.	22.	22.	23.
23.	24.	25.	25.	26.	26.	27.	27.	28.	28.
29.	29.	30.	30.	31.	31.	32.	32.	32.	33.
33.	34.	34.	34.	35.	35.	35.	36.	36.	36.
37.	37.	37.	38.	38.	40.	44.	50.	59.	68.
78.	88.	96.	110.	126.	131.	141.	152.	164.	178.
188.	200.	213.	224.	236.	247.	258.	268.	278.	289.
300.	313.	326.	341.	444.	811.	1537.	2654.	4133.	5985.
8065.	10429.	12866.	13998.	13791.	13868.	7969.	4674.	3471.	2982.
2563.	1765.	1362.	1101.	913.	780.	691.	624.	567.	574.
559.	550.	545.	542.	536.	528.	503.	497.	465.	450.
446.	439.	426.	426.	424.	423.	416.	367.	334.	264.
213.	191.	159.	143.	136.	119.	116.	103.	96.	89.
84.	79.	74.	69.	65.	62.	58.	55.	52.	49.
46.	44.	41.	39.	37.	35.	33.	32.	30.	29.
28.	28.	27.	26.	26.	25.	25.	24.	24.	24.
24.	23.	23.	23.	23.	23.	23.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	21.
21.	21.	20.	20.	19.	18.	18.	17.	17.	16.

```
                                           STORAGE
   580.     580.     580.     580.     580.     580.     580.     580.     580.     580.
   580.     580.     580.     580.     580.     580.     580.     580.     580.     580.
   580.     580.     580.     580.     580.     580.     580.     580.     580.     580.
   580.     580.     580.     580.     580.     580.     580.     580.     580.     580.
   580.     580.     580.     580.     580.     580.     580.     580.     580.     580.
   580.     580.     580.     580.     580.     580.     580.     580.     580.     580.
   580.     580.     580.     580.     580.     581.     581.     581.     581.     581.
   581.     581.     581.     581.     581.     582.     582.     582.     582.     583.
   583.     583.     584.     584.     584.     585.     585.     585.     585.     586.
   586.     586.     586.     587.     587.     587.     587.     588.     588.     588.
   588.     588.     589.     589.     589.     589.     589.     590.     590.     590.
   590.     590.     590.     591.     591.     591.     591.     591.     591.     592.
   592.     592.     592.     592.     592.     592.     592.     593.     593.     593.
   593.     593.     593.     593.     593.     593.     594.     593.     594.     594.
   594.     594.     594.     594.     594.     595.     596.     597.     599.     601.
   603.     605.     607.     608.     610.     612.     614.     615.     617.     619.
   621.     622.     624.     624.     627.     629.     630.     632.     633.     634.
   636.     637.     639.     640.     642.     642.     635.     627.     663.     578.
   533.     473.     399.     314.     226.     136.      73.      44.      33.      20.
    23.      20.      18.      16.      15.      14.      14.      13.      13.      13.
    13.      12.      12.      12.      12.      12.      12.      12.      12.      12.
    11.      11.      11.      11.      11.      11.      11.      11.      12.       9.
     9.       8.       8.       7.       7.       7.       7.       6.       6.       6.
     6.       6.       6.       5.       5.       5.       5.       5.       5.       5.
     5.       5.       4.       4.       4.       4.       4.       4.       4.       4.
     4.       4.       4.       4.       4.       4.       4.       4.       4.       4.
     4.       4.       4.       4.       3.       3.       3.       3.       3.       3.
     3.       3.       3.       3.       3.       3.       3.       3.       3.       3.
     3.       3.       3.       3.       3.       3.       3.       3.       3.       3.
     3.       3.       3.       3.       3.       3.       3.       3.       3.       3.
                                           STAGE
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3    428.3
   428.3    428.3    428.4    428.4    428.4    428.4    428.4    428.4    428.4    428.4
   428.4    428.4    428.4    428.4    428.5    428.5    428.5    428.5    428.5    428.5
   428.5    428.5    428.5    428.5    428.5    428.5    428.5    428.5    428.5    428.5
   428.5    428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6
   428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6
   428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6    428.6
   428.7    428.7    428.7    428.7    428.7    428.7    428.7    428.7    428.8    428.9
   428.9    429.0    429.0    429.1    429.1    429.2    429.2    429.3    429.3    429.4
   429.4    429.5    429.5    429.6    429.6    429.7    429.7    429.9    429.8    429.8
   429.9    429.9    430.0    430.0    430.0    430.0    429.9    429.6    429.1    428.2
   426.8    425.2    422.5    418.9    414.4    409.3    401.6    395.6    392.7    391.4
   386.1    387.2    385.5    384.3    383.3    382.5    381.9    381.5    381.2    381.0
   380.9    380.9    380.8    380.8    380.8    380.7    380.5    380.3    380.2    380.0
   379.9    379.9    379.8    379.8    379.8    379.8    379.7    379.6    379.4    379.1
   377.4    377.0    376.6    376.3    376.1    375.9    375.7    375.5    375.4    375.2
   375.1    375.0    374.9    374.7    374.5    374.5    374.4    374.3    374.2    374.1
   374.0    373.9    373.9    373.8    373.7    373.6    373.5    373.5    373.4    373.4
   373.3    373.3    373.2    373.2    373.2    373.2    373.1    373.1    373.1    373.1
   373.1    373.1    373.1    373.0    373.0    373.0    373.0    373.0    373.0    373.0
   373.0    373.0    373.0    373.0    373.0    373.0    373.0    373.0    373.0    373.0
   373.0    373.0    373.0    373.0    373.0    373.0    373.0    373.0    373.0    373.0
   372.9    372.9    372.9    372.9    372.8    372.8    372.8    372.7    372.7    372.6

PEAK OUTFLOW IS    14037. AT TIME  15.46 HOURS

                  PEAK    6-HOUR    24-HOUR    72-HOUR    TOTAL VOLUME
         CFS    13860.     1833.      474.       455.        136630.
         CMS      392.       52.       13.        13.          3869.
      INCHES               56.83     58.84      58.84          58.84
          MM             1443.46   1494.57    1494.57        1494.57
       AC-FT                909.      941.       941.           941.
  THOUS CU M               1121.     1161.      1161.          1161.
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THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WERE USE A TIME INTERVAL OF .083 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	= ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
14.900	0.000	341.		341.	0.	0.	0.
14.921	.021	367.		349.	18.	18.	0.
14.942	.042	393.		367.	26.	43.	0.
14.963	.063	418.		390.	28.	71.	0.
14.983	.083	444.		444.	0.	71.	0.
15.004	.104	536.		507.	29.	99.	0.
15.025	.125	628.		598.	30.	131.	0.
15.046	.146	719.		690.	30.	161.	0.
15.067	.167	811.		811.	0.	161.	0.
15.088	.188	883.		955.	38.	199.	0.
15.108	.208	1176.		1122.	52.	251.	0.
15.129	.229	1355.		1317.	39.	290.	0.
15.150	.250	1537.		1537.	-0.	290.	0.
15.171	.271	1716.		1741.	30.	325.	1.
15.192	.292	2095.		2048.	47.	373.	1.
15.213	.313	2375.		2340.	35.	408.	1.
15.233	.333	2654.		2634.	-0.	408.	1.
15.254	.354	3024.		2991.	33.	440.	1.
15.275	.375	3394.		3350.	43.	484.	1.
15.296	.396	3763.		3731.	32.	516.	1.
15.317	.417	4133.		4133.	-0.	516.	1.
15.338	.437	4561.		4596.	35.	551.	1.
15.358	.458	5049.		5001.	48.	599.	1.
15.379	.479	5507.		5468.	39.	638.	1.
15.400	.500	5965.		5965.	0.	638.	1.
15.421	.521	6495.		6478.	17.	654.	1.
15.442	.542	7025.		7031.	24.	678.	1.
15.463	.562	7659.		7931.	24.	702.	1.
15.483	.583	8085.		8045.	0.	702.	1.
15.504	.604	8660.		8663.	6.	709.	1.
15.525	.625	9253.		9246.	7.	716.	1.
15.546	.646	9838.		9833.	4.	720.	1.
15.567	.667	16422.		16422.	-0.	720.	1.
15.588	.687	10857.		10931.	-73.	646.	1.
15.608	.708	11291.		11353.	-62.	584.	1.
15.629	.729	11726.		11763.	-37.	546.	1.
15.650	.750	12160.		12160.	0.	546.	1.
15.671	.771	12670.		12745.	-75.	471.	1.
15.692	.792	12779.		12916.	-137.	335.	1.
15.713	.812	13040.		13274.	-186.	149.	0.
15.733	.833	13398.		13398.	0.	149.	0.
15.754	.854	13494.		13501.	-7.	142.	0.
15.775	.875	13569.		13598.	-0.	134.	0.
15.796	.896	13665.		13692.	-6.	127.	0.
15.817	.917	13781.		13781.	0.	127.	0.
15.838	.937	13460.		13467.	-47.	80.	0.
15.858	.958	13826.		13953.	-133.	-72.	-0.
15.879	.979	13840.		14037.	-197.	-269.	-0.
15.900	1.000	13866.		13860.	0.	-269.	-0.

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 2 TO 3

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

MSTPS	MSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
0	10000600	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QWI(1)	QWI(2)	QWI(3)	FLPWT	ELMAX	ELMIN	SEL
.1600	.0930	.1000	340.0	380.0	400.	.07600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	383.00	25.00	370.00	125.00	361.00	125.00	360.00	150.00	360.00	
150.00	361.00	250.00	370.00	325.00	380.00					

STORAGE	0.00	.24	.61	1.26	2.02	3.06	4.33	5.83	7.59	9.50
	11.64	13.94	16.32	18.80	21.38	24.06	26.85	29.73	32.72	35.81
OUTFLOW	0.00	203.97	601.46	1446.76	2673.13	4296.94	6409.38	9059.15	12292.86	16159.37
	20647.85	26482.90	32753.55	39630.96	47166.93	55403.10	64285.50	73841.15	84077.88	95004.68
STAGE	360.00	361.09	362.11	363.16	364.21	365.26	366.32	367.37	368.42	369.47
	370.51	371.54	372.63	373.69	374.74	375.79	376.84	377.89	378.95	380.00
FLOW	0.00	203.97	601.46	1446.76	2673.13	4296.94	6409.38	9059.15	12292.86	16159.37
	20647.85	26482.90	32753.55	39630.96	47166.93	55403.10	64285.50	73841.15	84077.88	95004.68

MAXIMUM STAGE IS 360.0

STATION 3, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	2.	2.	3.	3.
4.	4.	5.	6.	6.	7.	7.	8.	9.	9.
10.	11.	12.	12.	13.	14.	14.	15.	16.	16.
17.	18.	18.	19.	20.	20.	21.	21.	22.	23.
23.	24.	24.	25.	26.	26.	27.	27.	28.	28.
29.	29.	30.	30.	31.	31.	31.	32.	32.	33.
33.	34.	34.	34.	35.	35.	35.	36.	36.	36.
37.	37.	37.	38.	39.	40.	42.	44.	57.	66.
76.	86.	97.	108.	118.	129.	140.	151.	162.	174.
186.	198.	211.	223.	235.	248.	257.	267.	277.	287.
299.	312.	325.	339.	426.	756.	1444.	2579.	3985.	5704.
7903.	10233.	12866.	13368.	13799.	13830.	8767.	4592.	3722.	2888.
2693.	1709.	1344.	1127.	930.	743.	699.	644.	611.	576.
546.	516.	501.	462.	530.	533.	511.	499.	467.	451.
441.	433.	426.	426.	424.	423.	417.	391.	337.	272.
218.	194.	163.	149.	132.	121.	112.	104.	97.	90.
83.	78.	75.	76.	66.	62.	59.	55.	52.	49.
47.	44.	42.	39.	37.	35.	33.	32.	31.	29.
29.	28.	27.	26.	26.	25.	25.	24.	24.	24.
24.	23.	23.	23.	23.	23.	23.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	21.
21.	21.	20.	20.	19.	19.	19.	17.	17.	16.

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STOR

STAGE

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	13436.	1033.	474.	455.	1366827.
CMS	322.	52.	13.	13.	3869.
INCHES		56.83	58.84	58.84	58.84
AC-FT		1443.47	1494.54	1494.54	1494.54
THOUS CU M		909.	941.	941.	941.
		1121.	1161.	1161.	1161.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 369.8

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 3 TO 4

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	6	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	0160000C	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QMIN	QMED	QMAX	ELMNT	ELMAX	ELMIN	SEL
.1000	.1000	.1000	300.0	330.0	1466.	.04300

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 233.00 199.00 310.00 240.00 303.00 240.00 300.00 265.00 300.00
265.00 301.00 359.00 310.00 450.00 330.00

STORAGE	0.00	1.27	2.55	5.02	9.49	15.97	24.45	34.71	46.63	59.35
	71.67	85.00	101.31	117.44	134.97	153.38	172.63	192.06	214.20	236.63
OUTFLOW	0.00	192.77	455.07	999.94	2037.74	3771.66	6372.84	10190.01	15129.97	21163.07
	28141.05	36291.02	45562.88	56027.96	67716.35	80676.37	94944.36	110564.52	127578.76	146020.68
STAGE	306.00	308.59	309.16	309.74	306.32	307.89	309.47	311.05	312.63	314.21
	315.79	317.37	318.95	320.53	322.11	323.68	325.26	326.84	328.42	330.00
FLOW	0.00	192.77	455.07	999.94	2037.74	3771.66	6372.84	10190.01	15129.97	21163.07
	28141.05	36291.02	45562.88	56027.96	67716.35	80676.37	94944.36	110564.52	127578.76	146020.68

STATION 4, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	2.	2.	1.
3.	4.	4.	5.	5.	6.	7.	7.	8.	9.
9.	10.	11.	11.	12.	13.	13.	14.	15.	15.
16.	17.	17.	18.	19.	19.	20.	21.	21.	22.
23.	23.	24.	24.	25.	25.	26.	27.	27.	28.
28.	29.	29.	30.	30.	30.	31.	31.	32.	32.
33.	33.	33.	34.	34.	35.	35.	35.	36.	36.
36.	37.	37.	37.	38.	38.	40.	44.	48.	57.
69.	79.	85.	93.	106.	116.	127.	138.	149.	163.
178.	191.	203.	216.	228.	239.	252.	261.	271.	281.
292.	304.	317.	331.	378.	565.	1028.	1879.	3188.	4994.
6491.	9329.	11456.	12935.	13578.	13845.	13790.	6144.	4047.	3116.
2812.	2267.	1693.	1364.	1059.	847.	765.	672.	629.	594.
572.	557.	540.	544.	541.	535.	522.	503.	491.	482.
468.	454.	432.	428.	425.	424.	420.	408.	389.	311.
252.	207.	174.	156.	145.	134.	124.	114.	106.	99.
92.	86.	81.	76.	71.	67.	63.	60.	56.	53.
50.	47.	45.	42.	40.	38.	36.	34.	32.	31.
30.	29.	28.	27.	27.	26.	25.	79.	25.	24.
24.	24.	23.	23.	23.	23.	23.	23.	23.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
21.	21.	21.	20.	20.	19.	19.	19.	17.	17.

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                                              STOR
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        2.        2.        2.        2.        2.        2.        2.
        2.        2.        2.        2.        2.        3.        5.        9.       14.       26.
       26.       32.       30.       41.       43.       43.       36.       24.       17.       14.
       12.       10.        4.        6.        5.        5.        4.        4.        3.        3.
        3.        3.        3.        3.        3.        3.        3.        3.        3.        3.
        3.        2.        2.        2.        2.        2.        2.        2.        2.        2.
        2.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.

                                             STAGE
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0     300.0
     300.0     300.0     300.0     300.0     300.1     300.1     300.1     300.1     300.1     300.1
     300.1     300.1     300.1     300.1     300.1     300.1     300.1     300.1     300.2     300.2
     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2
     300.2     300.2     300.2     300.3     300.3     300.3     300.3     300.3     300.3     300.3
     300.3     300.3     300.3     300.3     300.3     300.3     300.3     300.3     300.3     300.3
     300.3     300.3     300.3     300.3     300.4     300.4     300.4     300.4     300.4     300.4
     300.4     300.4     300.4     300.4     300.4     300.4     300.4     300.5     300.5     300.6
     300.7     300.8     300.9     301.0     301.1     301.2     301.3     301.4     301.5     301.6
     301.7     301.8     301.8     301.9     302.0     302.0     302.1     302.1     302.2     302.2
     302.3     302.4     302.4     302.5     302.8     303.5     304.8     306.1     307.4     308.6
     309.7     310.7     311.5     311.9     312.2     312.2     311.2     309.3     308.1     307.5
     307.0     304.4     305.7     305.2     304.4     304.4     304.1     303.8     303.7     303.6
     303.5     303.4     303.4     303.4     303.4     303.4     303.4     303.3     303.2     303.2
     303.1     303.1     303.0     303.0     303.0     303.0     303.0     302.9     302.7     302.4
     302.1     301.9     301.7     301.4     301.5     301.4     301.3     301.2     301.1     301.0
     301.0     300.9     300.8     300.8     300.7     300.7     300.7     300.6     300.6     300.5
     300.5     300.5     300.5     300.4     300.4     300.4     300.4     300.4     300.3     300.3
     300.3     300.3     300.3     300.3     300.3     300.3     300.3     300.3     300.3     300.3
     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2
     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2
     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2
     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2     300.2

                          PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                CFS     13845.     1933.       474.       455.        136627.
                CMS       392.       55.        13.        13.          3869.
             INCHES                56.82      58.83      58.83          58.83
                 MM              1443.32    1494.32    1494.32        1494.32
              AC-FT                 909.       941.       941.           941.
        THOUS CU M                 1121.      1160.      1160.          1160.

                                      MAXIMUM STORAGE =       43.

   MAXIMUM STAGE IS      312.2
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HYDROGRAPH ROUTING

CHANNEL ROUTING -MODIFIED PULS- STATION 4 TO 5

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	LPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
0	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QMAIN	QMAIN	QMAIN	ELMUT	ELMAX	DLMIN	SEL
.1000	.1300	.1000	290.0	310.0	400.	.02500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	310.00	300.00	300.00	675.00	291.00	675.00	290.00	700.00	290.00	
700.00	291.00	900.00	300.00	850.00	310.00					

STORAGE	0.00	.24	.78	1.83	3.46	5.61	8.30	11.52	15.28	19.57
	24.39	29.57	35.12	41.02	47.28	53.89	60.86	68.19	75.87	83.91
OUTFLOW	0.00	49.94	244.60	604.63	1402.20	2761.12	4575.85	7014.48	10150.38	14053.15
	18962.01	24487.43	31673.80	39339.44	47621.84	57447.16	67644.84	79444.56	91975.73	105368.02
STAGE	290.00	291.05	292.11	293.16	294.21	295.26	296.32	297.37	298.42	299.47
	300.53	301.58	302.63	303.68	304.74	305.79	306.84	307.89	308.95	310.00
FLOW	0.00	49.94	244.60	604.63	1402.20	2761.12	4575.85	7014.48	10150.38	14053.15
	18962.01	24487.43	31673.80	39339.44	47621.84	57447.16	67644.84	79444.56	91975.73	105368.02

STATION 5, PLAN 1, RTIO 4

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	2.	2.	2.
3.	3.	4.	4.	5.	6.	6.	7.	8.	8.
9.	10.	10.	11.	12.	12.	13.	14.	14.	15.
16.	16.	17.	18.	19.	19.	20.	20.	21.	22.
22.	23.	23.	24.	25.	25.	26.	26.	27.	27.
28.	28.	29.	29.	30.	30.	31.	31.	32.	32.
32.	33.	33.	34.	34.	34.	35.	35.	35.	36.
36.	36.	37.	37.	37.	38.	39.	42.	46.	52.
66.	78.	90.	91.	101.	112.	122.	133.	144.	157.
172.	185.	198.	210.	223.	236.	249.	257.	261.	277.
294.	309.	312.	326.	359.	446.	692.	1619.	2649.	4917.
6547.	8198.	11136.	12742.	13547.	13946.	11930.	6482.	4313.	3425.
2934.	2678.	1807.	1373.	1134.	931.	798.	714.	665.	614.
570.	542.	532.	548.	542.	537.	527.	510.	493.	489.
453.	441.	434.	426.	426.	424.	422.	412.	383.	332.
273.	224.	190.	165.	144.	139.	124.	118.	113.	102.
95.	90.	83.	78.	73.	69.	65.	61.	54.	50.
52.	49.	46.	44.	41.	39.	37.	35.	33.	32.
31.	29.	28.	28.	27.	26.	26.	25.	25.	24.
24.	24.	24.	23.	23.	23.	23.	23.	23.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
22.	22.	22.	22.	22.	22.	22.	22.	22.	22.
21.	21.	21.	21.	21.	20.	19.	19.	18.	17.

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STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	2.	4.	6.	8.
11.	14.	16.	18.	19.	19.	17.	11.	8.	7.
6.	5.	4.	3.	3.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0	290.0
290.1	290.1	290.1	290.1	290.1	290.1	290.1	290.1	290.1	290.1
290.2	290.2	290.2	290.2	290.2	290.2	290.2	290.2	290.2	290.3
290.3	290.3	290.3	290.3	290.3	290.3	290.3	290.4	290.4	290.4
290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.5	290.5	290.5
290.5	290.5	290.5	290.5	290.5	290.5	290.5	290.5	290.5	290.6
290.6	290.6	290.6	290.6	290.6	290.6	290.6	290.6	290.6	290.6
290.6	290.6	290.6	290.6	290.6	290.7	290.7	290.7	290.8	290.9
291.0	291.1	291.2	291.2	291.3	291.3	291.4	291.5	291.5	291.6
291.7	291.9	291.5	291.9	292.0	292.0	292.1	292.1	292.2	292.2
292.2	292.2	292.3	292.3	292.4	292.7	293.4	294.3	295.3	296.3
297.2	298.0	298.7	294.1	299.4	299.4	298.8	297.3	296.2	295.7
295.3	299.0	294.5	294.1	293.7	293.9	293.3	293.2	293.1	293.0
292.9	297.0	292.8	292.8	292.9	292.8	292.8	292.7	292.7	292.6
292.6	292.6	292.6	292.5	292.5	292.5	292.5	292.5	292.4	292.3
292.2	292.0	291.8	291.7	291.6	291.5	291.4	291.4	291.3	291.3
291.2	291.2	291.2	291.2	291.1	291.1	291.1	291.1	291.0	290.9
290.9	290.8	290.8	290.8	290.7	290.7	290.6	290.6	290.6	290.5
290.5	290.5	290.5	290.5	290.5	290.5	290.4	290.4	290.4	290.4
290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4
290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4
290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4	290.4
290.4	290.4	290.4	290.4	290.3	290.3	290.3	290.3	290.3	290.3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	13846.	1833.	474.	455.	136547.
CMS	392.	52.	13.	13.	3866.
INCHES		56.42	58.83	58.83	58.83
MM		1433.29	1494.21	1494.21	1494.21
AC-FT		909.	941.	941.	941.
THOUS CU M		1121.	1160.	1160.	1160.

MAXIMUM STORAGE = 19.

MAXIMUM STAGE IS 299.4

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .25	RATIO 2 .50	RATIO 3 .75	RATIO 4 1.00
HYDROGRAPH AT	1	.30	1	665.	1329.	1994.	2659.
		.781		18.823(	37.645(	56.468(	75.291(
ROUTED TO	2	.30	1	196.	13532.	14332.	13960.
		.781		5.551(	383.191(	405.861(	395.461(
ROUTED TO	3	.30	1	196.	13554.	14290.	13836.
		.781		5.551(	383.861(	404.661(	391.831(
ROUTED TO	4	.30	1	196.	13453.	14288.	13845.
		.781		5.541(	380.951(	404.581(	392.061(
ROUTED TO	5	.30	1	195.	13395.	14307.	13846.
		.781		5.531(	379.311(	405.141(	392.081(

Reservoir + Flood Volume = 129 ac-ft
$\therefore Q_p$ (w/ Surcharge) $\approx$ 129 occfs
Calc. = 13732 cfs
Good!

SUMMARY OF DAM SAFETY ANALYSIS - Flashboards, Breach.

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	420.25	420.25	430.00
STORAGE	580.	580.	640.
OUTFLOW	0.	0.	336.

RATIO OF PMP	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.25	429.47	0.00	622.	196.	0.00	16.25	0.00
.50	430.25	.25	650.	13717.	.35	16.61	15.83
.75	430.35	.35	653.	14332.	.46	16.58	15.58
1.00	430.05	.05	642.	14037.	.29	15.48	14.50

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	196.	361.6	16.25
.50	13554.	368.8	16.75
.75	14290.	369.0	16.58
1.00	13836.	368.8	15.50

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	196.	301.8	16.33
.50	13453.	312.1	16.75
.75	14288.	312.4	16.58
1.00	13845.	312.2	15.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.25	195.	241.8	16.33
.50	13395.	299.3	16.75
.75	14307.	299.5	16.58
1.00	13846.	299.4	15.50

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Form W-16-GC-12-27

Dam Application No. 133

State of New Jersey
Department of Conservation and Development

REPORT ON DAM APPLICATION

To the Board of Conservation and Development,
State of New Jersey.

Gentlemen:

The application of The Passaic Consolidated Water Company

filed September 1, 1927 for approval of plans and for a permit to raise a dam

known as Great Notch Reservoir near Great Notch on Yantacaw River tributary

to Passaic River in Passaic County, New Jersey, has been examined by

John E. Brooks Hydraulic Engineer. Passaic 26-5

PRINCIPAL FEATURES

Location	26.2.5.7.2		Site inspected	October 3, 1929.	
Purpose of dam	Water supply				
Drainage area	0.3 sq. mi.				
Area of lake	33 acres.		Capacity of lake	290	Mill. gals.
Type of dam	Earth fill, concrete core wall		Top width	15	feet.
Upstream slope	2:1		Downstream slope	2:1	
Length of dam	730 460 FROM SCALING feet.		Max. height	30	feet.
Foundation material	Ledge rock. Trap				
Type of spillway	Concrete o.f.		Length of spillway	44	feet.
Max. head on spillway	2' with flashboards on and 1' freeboard 4 feet. with flashboards out and 1' freeboard				
Spillway capacity	1390 sec. ft. per sq. mi. with flashboards on				
Outlets other than spillway	1 - 36" C.I. blow-off) 1 - 48" Steel supply main) Gate valves in gate house.				

It has been found that the site for the dam is suitable and the plans adequate to insure the construction of a structure which will not be a menace to life or property. It is therefore recommended that the plans be approved and that a permit be issued, subject, however to the following terms and conditions:—

1. That this permit does not give any property rights, either in real estate or material, nor any exclusive privileges; neither does it authorize any injury to private property nor invasion of private rights, nor any infringement of Federal, State or local laws or regulations; nor does it waive the obtaining of Federal assent, when necessary.

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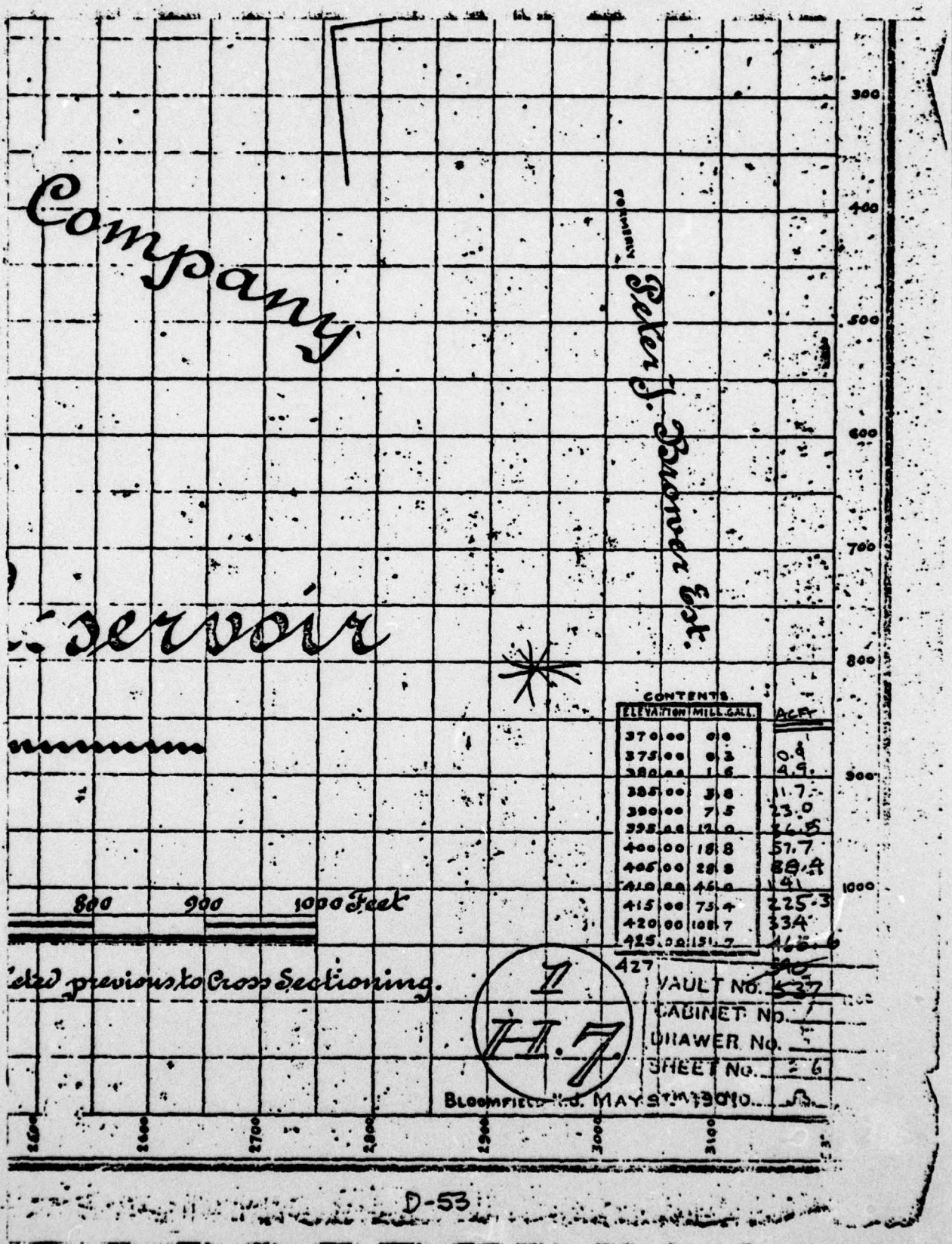
Company
Peter J. Brown Est.
formerly
-servoir
CONTENTS.
ELEVATION | MILL. GAL. | ACFT
370.00 | 0.0 |
375.00 | 0.3 | 0.4
380.00 | 1.6 | 4.9
385.00 | 3.8 | 11.7
390.00 | 7.5 | 23.0
395.00 | 12.0 | 36.8
400.00 | 18.8 | 57.7
405.00 | 28.8 | 88.4
410.00 | 46.0 | 141
415.00 | 73.4 | 225.3
420.00 | 108.7 | 334
425.00 | 151.7 | 465.6
427 | 540
800 900 1000 Feet
elled previous to Cross Sectioning.
H.7
VAULT NO. 537
CABINET NO.
DRAWER NO.
SHEET NO. 26
BLOOMFIELD N.J. MAY 5TH 1910.
2600 2700 2800 2900 3000 3100
300 400 500 600 700 800 900 1000

PLATE D-1

1000 0 1000 2000 3000 4000

SCALE IN FEET

AREA LOCATION

GREAT NOTCH DAM

JENNY-LEEDSHILL JANUARY 1979

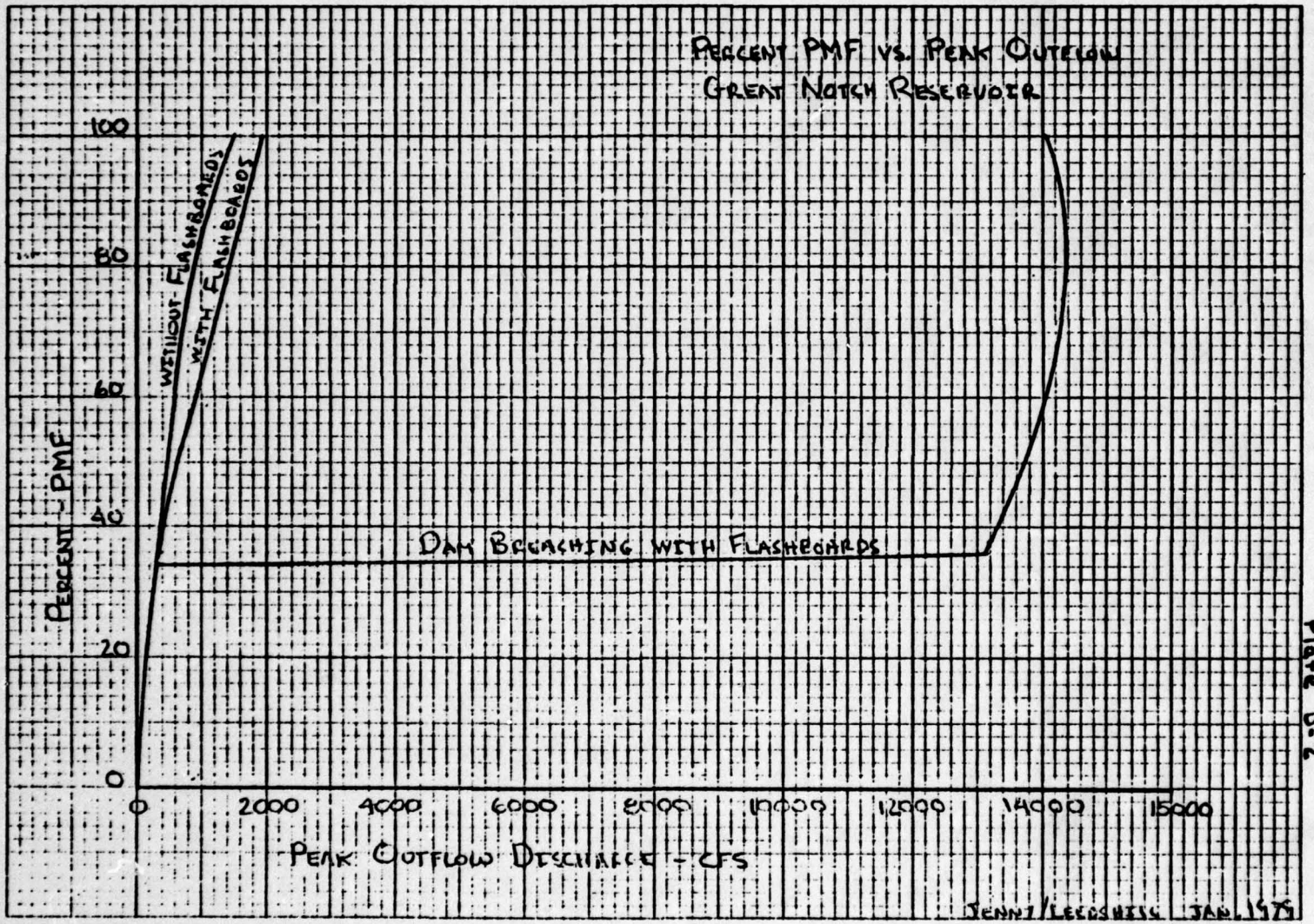

Plate D-2

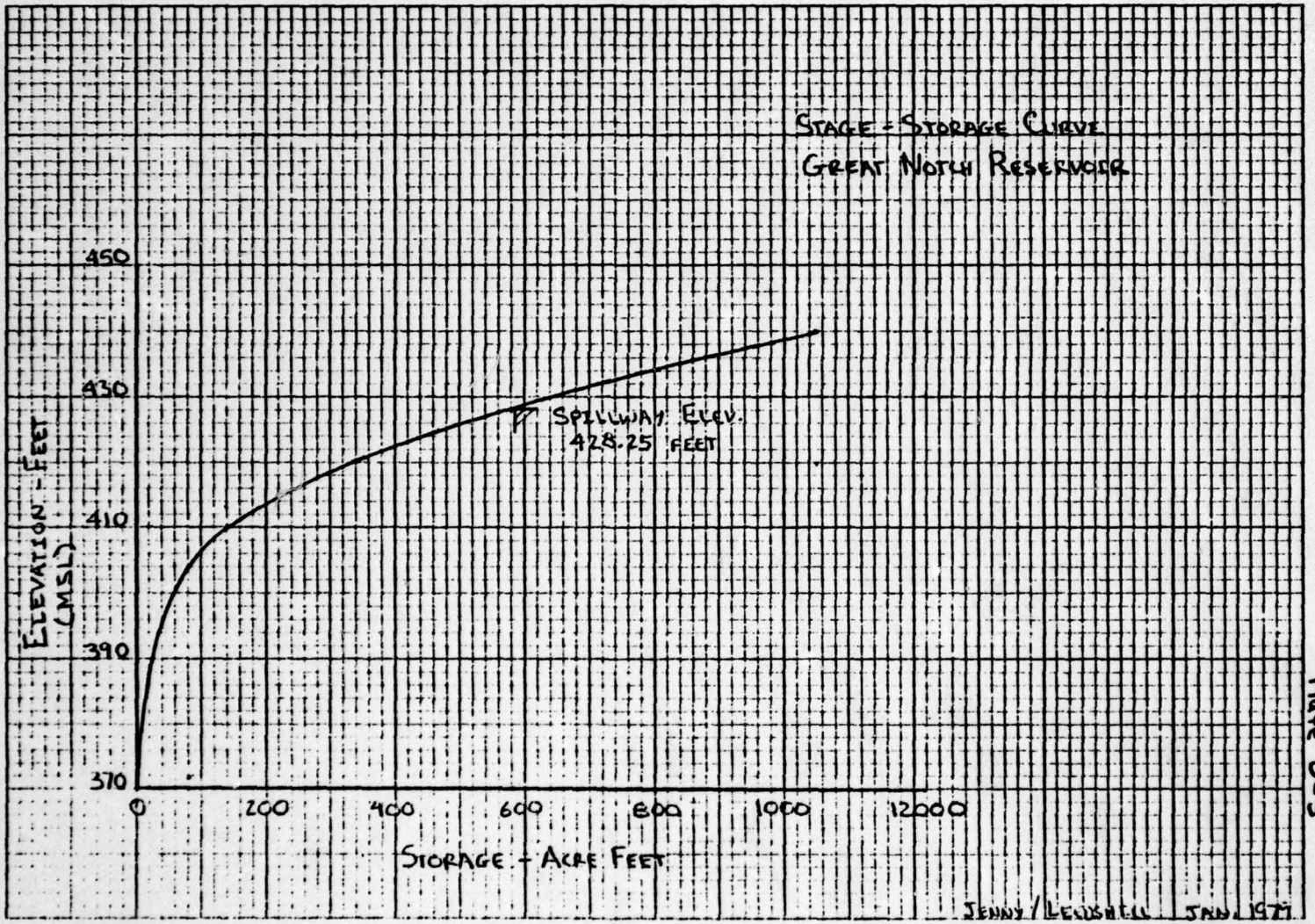

Plate D-3

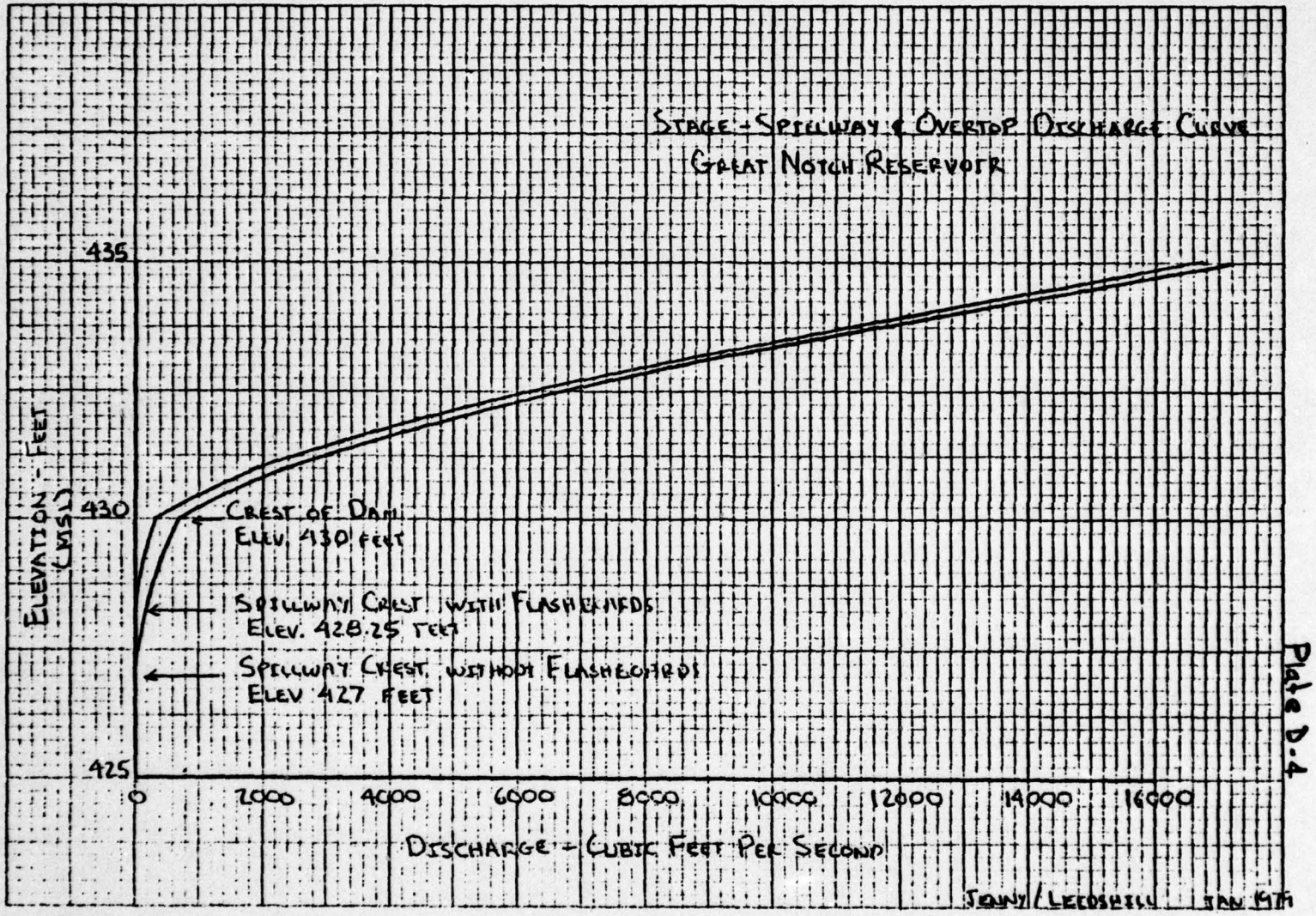

Plate D-4